

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

AN OPTIMIZATION OF THE BASIC SCHOOL MILITARY
OCCUPATIONAL SKILL ASSIGNMENT PROCESS

by

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June 2003

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**AN OPTIMIZATION OF THE BASIC SCHOOL MILITARY OCCUPATIONAL
SKILL ASSIGNMENT PROCESS**

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ABSTRACT

The Basic School (TBS) is the first school assignment for all Marine Officers. While assigned to TBS unrestricted ground officers (those without air and law contract guarantees) compete for and are assigned a Military Occupational Skill (MOS). The process of educating the Marine Officers about the different MOSs is primarily accomplished by word of mouth at MOS Mixers (social events) and one-on-one discussions. The assignment of the MOS to the Marine Officer is based on the officer's lineal standing within his/her company. Officers are ranked lineally based on a composite score of academic and leadership grades. To ensure a quality distribution of officers into MOSs, the company is divided into thirds (Top, Middle, Bottom) and the vacancies assigned to the company are divided into thirds (Top, Middle, Bottom). Officers compete for an MOS within their assigned third. The current assignment system has remained virtually unchanged over the last thirty years. It is a mostly manually process that provides little visibility of the data, and does not utilize automated information tools for report generation of statistical information.

This joint thesis team has developed a Two-Tier Client/Server Information Management System for use by the lieutenants and staff officers of The Basic School and it is called MyMOS. This system was developed using current industry standards that are compliant with those of the Department of Defense. It is the first of its kind at TBS and is designed to be employed as an operational system.

MyMOS was designed with an interface that would maximize acceptance and reduce total ownership cost.

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I. INTRODUCTION

A. BACKGROUND

The Internet is nearly ubiquitous in 2003. In fact, the Internet represents a significant source of information for Marines of all grades and positions. The Headquarters, U.S. Marine Corps website¹ serves a Business to Consumer (B2C) function with links to information and departments at Headquarters Marine Corps (HQMC). However, the abundance of resources, in terms of money and manpower, has allowed HQMC to position itself as a leader in information technology utilization within the Corps.

Organizations such as The Basic School, which possess limited monetary and human resources, have found themselves challenged to leverage the capabilities of the Internet and e-commerce strategies. The mission of The Basic School is to educate newly commissioned or appointed officers in the high standards of professional knowledge, *esprit de corps*, and leadership required to prepare them for duty as a company grade officer in the operating forces, with particular emphasis on the duties, responsibilities, and warfighting skills required of a rifle platoon commander².

The primary mission of TBS is to educate officers. However, for those officers who do not have a guaranteed air or law contract, perhaps the most significant event during this first tour of duty is the assignment of their Military Occupational Skill (MOS). This singular event will determine the course of their careers.

Unfortunately, few administrative functions of the school utilize automated office tools. For example, the

¹ Website: Headquarters, USMC <http://www.hqmc.usmc.mil>

existing process by which officers select their Military Occupational Specialty (MOS) provides a good example of a practice that is ripe for automation. The new officers prioritize their MOS selection from one to twenty-three (seventeen for females) in handwritten form on a 3" x 5" index card; these selections are then manually entered into a spreadsheet. After some human intervention to ensure a good MOS assignment for each officer, the selection process finishes based on a numerical algorithm that is used to ensure the top graduates are not over-represented in one set of specialties. Once the MOS selection is complete, the staff of TBS manipulates the data in the spreadsheet and then produces numerous reports for higher headquarters and archival purposes. This process repeats every few months for six graduating classes of up to 250 officers per year and requires several man-days' work.

Both the automation of this process, using computers resident in the school and accessible to the students, and the data manipulation can be completed in a matter of hours instead of days. Further, e-commerce practices can perform formatting and completing of reports necessary for higher headquarters. This will eliminate the requirement for a staff member to access multiple programs or manually enter the output from one database or spreadsheet into another³.

² Website: The Basic School, Quantico, VA <http://www.tbs.usmc.mil/>

³ S. Clifton, "Designing a Relational Database for The Basic School; Schools Command Web Enabled Officer and Enlisted Database (SWORD)," p. 2.

B. OBJECTIVES

This thesis follows the thesis work accomplished by Major Fred Ferares and Captain Scott Clifton.⁴ The objective of this research is an accurate data model representative of the information requirements, a Microsoft Access database, and a web interface which together comprises in a fully functioning, integrated and operationally deployable decision support system. The database is a multi-user database that supports concurrent users⁵. Utilizing a multi-tier architecture the system can support the push and pull of information necessary to meet the users' needs. The data is secured by incorporating the use of multiple access levels (i.e. student, staff, Commanding Officer/Executive Officer) and passwords. During this research, the database and website were hosted on a server within the NPS domain. However, when operationally deployed this information system will reside behind the TBS firewall, thereby providing an additional level of security.

The database and web interface serve as a decision support system for the lieutenants and staff of TBS. This system supports the lieutenants by providing both standard and custom information, which serves to educate them on the different MOSs and career paths. Additionally, it provides a mechanism by which the lieutenants can input their choices, in lieu of the 3" x 5" cards previously mentioned. For the staff of TBS, this system is a tool to provide for

⁴ Ibid

⁵ D. Kroenke, Database Processing Fundamentals, Design and Implementation, p. 6.

data management, report generation, and an optimized MOS assignment solution to use as a "starting point" in the MOS assignment process. Taken collectively, this information system allows for the compilation, dissemination, and analysis of information on a level previously unattainable with the business practices of The Basic School.

The benefits of this research are threefold. First is the capturing and diffusion of known knowledge concerning military occupational skills. This system provides for a standardized "one stop shop" for MOS information and serves to increase the distribution of that data. Lieutenants now have access to the full range of information on all 23 MOSs, not just the six or seven they were able to assemble during the MOS mixer. Second, the staff of TBS gains a level of data management unavailable to them previously. By utilizing preformatted reports, they will be able to recognize deficiencies in MOS demand prior to the assignment process. This will allow a concerted effort to "sell" an MOS with low demand. Capturing MOS demand information in a database will allow for historical trend analysis and data mining that may reap benefits that we cannot currently anticipate. Finally, by utilizing linear programming techniques we can provide a "best case" starting point for the staff of TBS. An optimized starting point saves countless man-hours of work and eliminates the staff's attempt to heuristically improve the MOS assignment process. Ultimately, it will result in an improved MOS assignment process, i.e., a greater number of lieutenants getting an MOS that they desired.

C. SCOPE

The scope of this thesis is threefold. First, we evaluate the current business practices of TBS and develop a database that will accurately model the information requirements necessary to conduct the MOS assignment process. Second, we have developed an operational web interface that will provide add, update, and delete functionality to and from the database. Third, the thesis evaluates the use of mathematical programming to find the optimal and most efficient way of matching MOSs to the lieutenants.⁶ This thesis provides TBS with an operational decision support system to enhance the MOS education and assignment process.

D. METHODOLOGY

In a way similar to that of our predecessors, we used a systems analysis approach in developing this decision support system. Four phases were used in the systems analysis approach: definition, requirements analysis, design, and implementation⁷. System refers to the project in its entirety: database, web interface, and optimization. Where necessary we addressed the database, web interface, and optimization specifically; however, the term system will refer to all three.

The research and development of this system focused on three distinct areas. First, we had to develop an accurate data model of the MOS education and assignment process. The development of this model had to include the capturing

⁶ C. Ragsdale, Spreadsheet Modeling and Decision Analysis, p. 16.

⁷ K. Forsberg, Visualizing Project Management 2nd Ed., p. 79.

and populating of information that would be necessary to educate the lieutenants on each MOS. An in-depth discussion of the specific development of this data model occurs in Chapter II.

After initiating the construction of the data model, we began to build the web interface. We developed the web interface with a graphical user input (GUI) consistent with the current TBS website and in accordance with U.S. Marine Corps website standards⁸. Additionally, design of the web interface emphasized the enhancement of information management for the students and the staff while minimizing the need to perform database administration. We purposefully leveraged the familiarity of users to the web browser whenever possible in order to minimize the ownership costs and resistance to change that normally accompanies the introduction of a new system⁹. Chapter III provides a thorough analysis of the web interface.

Upon completion of a fully functioning database and web interface, we focused on the development of an assignment algorithm, which would provide the highest number of lieutenants with the highest MOS choice. This optimization serves two purposes. First, it provides a starting point for the staff of TBS. Second, it will increase the lieutenants' satisfaction level with their MOS assignment. It is important to note it is not the intention of the authors to replace the decision maker with the optimization feature of this system. Chapter IV

⁸ Website, <http://www.usmc.mil/webstandards>, Jan 2003.

⁹ J. Conger, The Leader's Change Handbook, pp. 310-311.

presents a complete description of the optimization feature, including code and mathematical representation.

E. ORGANIZATION

The following is the organization of this thesis:

Chapter II provides an overview of the research and the logical and physical database design. Additionally it addresses database security and administration issues.

Chapter III provides an overview of the web interface to include design, database connectivity, security, and administration.

Chapter IV provides an overview of the assignment algorithms. This chapter presents and statistically compares the current heuristic process and a proposed optimized process.

Chapter V is a user's guide for the lieutenants and staff officers of The Basic School.

Chapter VI is a discussion of this system and its impact on the business process of MOS Assignments at The Basic School. Additionally it presents our conclusions regarding the acceptance and operational deployment of the system.

Appendix A is an Entity-Relationship diagram.

Appendix B is the specialized HTML and Visual Basic code used to program the web interface and optimization features.

Appendix C provides the statistical analysis in both tabular and graphical formats.

Appendix D is a graphical representation of the optimized assignment model.

Appendix E is the results of the survey presented to the students of Alpha Company.

II. RESEARCH STUDY & DATABASE DEVELOPMENT

A. METHODOLOGY

The concept of creating a two-tier architecture to improve the MOS assignment process was the result of two distinct events. The first was an exposure to linear programming and optimization techniques in OS3004¹⁰ (Operations Research for Computer Systems Managers) and exposure to the technology behind a multi-tiered architecture in IS4925¹¹ (E-Commerce Technology) at the Naval Postgraduate School. The second event was an introduction to the work of Major Ferares and Captain Clifton. These two officers were seeking students to continue their thesis work with The Basic School. Initially, Capt Boersma and LtCol Goldschmidt intended to develop an online training schedule module for TBS. Unfortunately, funding constraints prevented us from pursuing that area of research. However, our interest in optimization, since its introduction in OS3004, led us to propose a decision support system to the Executive Officer of TBS. This DSS would to assist in the MOS assignment process. Our familiarity with the MOS assignment process allowed us to perform the requirements analysis without having physically to travel to Quantico, Virginia.

We received approval from TBS in December of 2002¹². In January 2003 we began working with Alpha Company in order to conduct the requirements analysis, design,

¹⁰ Naval Postgraduate School Information System Technology Course Curriculum, 2001.

¹¹ Ibid.

¹² Reference an e-mail by the TBS Executive Officer, December 2002.

implementation, and surveys necessary to support the project. Systems analysis and database design began in January 2003 and was complete by April 2003. The design of the web interface began nearly simultaneously with the database design. Both the database and web interface designs followed the four-phase model described in Chapter I. The lack of a centralized information management system at TBS allowed us to proceed quickly with the design of the database.

B. SYSTEM DEFINITION PHASE

The basic school does not currently possess a decision support system for the education or assignment of MOSs to the lieutenants. The command currently uses a combination of MOS mixers, one-on-one discussions, and hard copy handouts to disseminate MOS information.¹³ MOS mixers are social events where officers with various MOSs talk to the lieutenants about the MOS. This methodology for MOS education has essentially remained unchanged for the last 30 years. The command recognizes that the amount of information lieutenants receive on each MOS may vary widely from lieutenant to lieutenant and company to company.¹⁴

Approximately three months into the 26-week training period, the company conducts a straw poll of MOS choices. The straw poll requires that each lieutenant submit his or her choices on a 3" x 5" card to the staff platoon commander. The straw poll serves several purposes. First, it allows the staff platoon commander to counsel each lieutenant on each of his or her choices and by doing so

¹³ Reference an interview with the XO of Alpha Company, January 2003.

¹⁴ Reference phone conversation with Alpha Company XO, March 2003.

either encourage or discourage the lieutenant on his or her decision. Secondly, it allows the company staff and the lieutenants to gain visibility of MOS demand. This is an important aspect of the assignment process since it allows the staff to recognize the under- and over-demanded MOSs. With that knowledge in hand, the staff can begin to "sell" under-demanded MOSs and discourage the selection of over-demanded MOSs. Equally important to the lieutenant is the knowledge of what MOSs he or she can have a reasonable expectation of receiving, based on his or her lineal standing within the company. Each company attempts to have 88% or more of the lieutenants within the company assigned to an MOS that was one of their top five choices. The heuristic improvement attempt is a direct result of this business rule.

The lieutenants receive their MOSs approximately 14 weeks into the 23-week training cycle. As with the straw poll, lieutenants submit their choices on a 3" x 5" card to their staff platoon commanders. The company executive office collects these cards and then transposes the information into a Microsoft Excel spreadsheet. Table 1 is a partial example of this spreadsheet.

Plt	Last Name	First Name	MI	SS#	Lineal	Choice	MOS	1	2	3	4	5	6	7	8	9
6	JONES	AARON	C		001			1802	1803	1302	0302	0203	5803	0204	0206	0802
4	SMITH	SARAH	M		020			1302	0206	0207	0602	0180	0402	7210	4302	6602
2	CLARK	JOHN	G		003			0204	0206	0203	0302	1302	0802	0602	0402	1803
3	BLAKE	TRAVIS	D		004			1802	0802	7204	0204	7208	1803	7220	7210	0302

Table 1 MOS Choices Spreadsheet.

It is important to note that the current system does achieve its purpose. The current system is, however, highly inefficient. Automation can reduce the workload on

the staff platoon commanders and the company executive officer. Additionally, automation can deliver a thorough and consistent product to provide MOS education to the lieutenants. While this system provides one solution to one command, it will serve as an excellent example of the capability of NPS to deliver an interdisciplinary solution to commanders in the field.

C. SYSTEM REQUIREMENTS PHASE

We conducted the first half of our requirements analysis through a series of phone interviews, e-mails, discussions with Marine officers located here at the Naval Postgraduate School, and our personal experiences with the MOS assignment process. Due to funding constraints, we were unable to travel to Quantico, Virginia, for interviews with the staff or lieutenants. The executive officer of TBS served as our point of contact. The Basic School recognized the potential for an information system but did not possess the means by which to define, develop, and implement a solution.

The second half our requirements analysis involved the obtaining and studying of forms, reports, and business rules regarding the MOS education and assignment process. In addition to obtaining the forms and reports necessary, we were able to procure the historical MOS data for two companies. We concluded our analysis with an informal agreement on the capability of the system to add, modify, delete, and create standard reports. The following is a list of requirements for the system:

1. Timeline

- A partially operational system by March 2003.
- A fully operational system by July 2003.

2. Focus of the Thesis

The first area of focus for this thesis was on developing an operational decision support system that will support educating the lieutenants on the MOS assignment process.

The second area of focus for this thesis was on developing a decision support system that will assist in the MOS assignment process for the staff officers of TBS.

3. User Interface

a. Student Interface

The system will provide the student access to MOS information and frequently asked questions.

When logged-in, the system allows the student to add and modify MOS choices. Additionally, students who are logged-in can view and print reports, including their personal choices, MOS Demand, and a Straw Poll analysis.

b. Staff Interface

Company Staff officers will have access to all MOS information, frequently asked questions, student information, and reports designed specifically for the staff. Staff reports include MOS distribution, MOS Demand by Name, MOS Choices, MOS Assignment, Counseling, Supply vs. Demand, Quality Distribution, and Statistics. Each of these reports is addressed in Chapter IV.

The Company Commander and Executive Officer will have access to administrative and assignment capabilities that are not available to the staff platoon commanders. These functions are discussed in Chapter IV.

4. Access (Security) Permissions

The model for security permissions denies access to all users unless he or she possesses specific authorization

to view, add, modify, or delete. There are four general classes of security: anonymous, student, staff (SPC), and staff (CO/XO).

Enforcement of security occurs at two levels. First, users view a different menu based on their security level. Secondly, each page validates the user's security level based on a session variable before the page is processed.

Table 2 provides additional information on groups and security.

User Group Name	Permission Description (Can Do)	Restriction Description (Can't Do)	Groups/Specific People
Anonymous	Permission: Read MOS information only	Access Reports Enter Choices	Internet Users
Student	Permission: Read all MOS information and write to MOS Choices	Access SPC or CO/XO Reports	Lieutenants
Staff (SPC)	Permission: Read all MOSs, Read all Staff Reports. Write to MOS Choice concurrence.	Access CO/XO Reports	Staff Platoon Commanders
Staff (CO/XO)	Permission: Read all MOSs, Read all Staff Reports. Write to MOS Assignments and MOS Choice concurrence.	None	Company Commanders Company Executive Officers

Table 2 User Group Matrix

5. Electronic Signature

A username and password authenticates the user. Authenticated users receive a session variable based on their security level. Session variables control access to the different web pages and track usage.

D. DATA DIAGRAMS

1. Dataflow Diagram

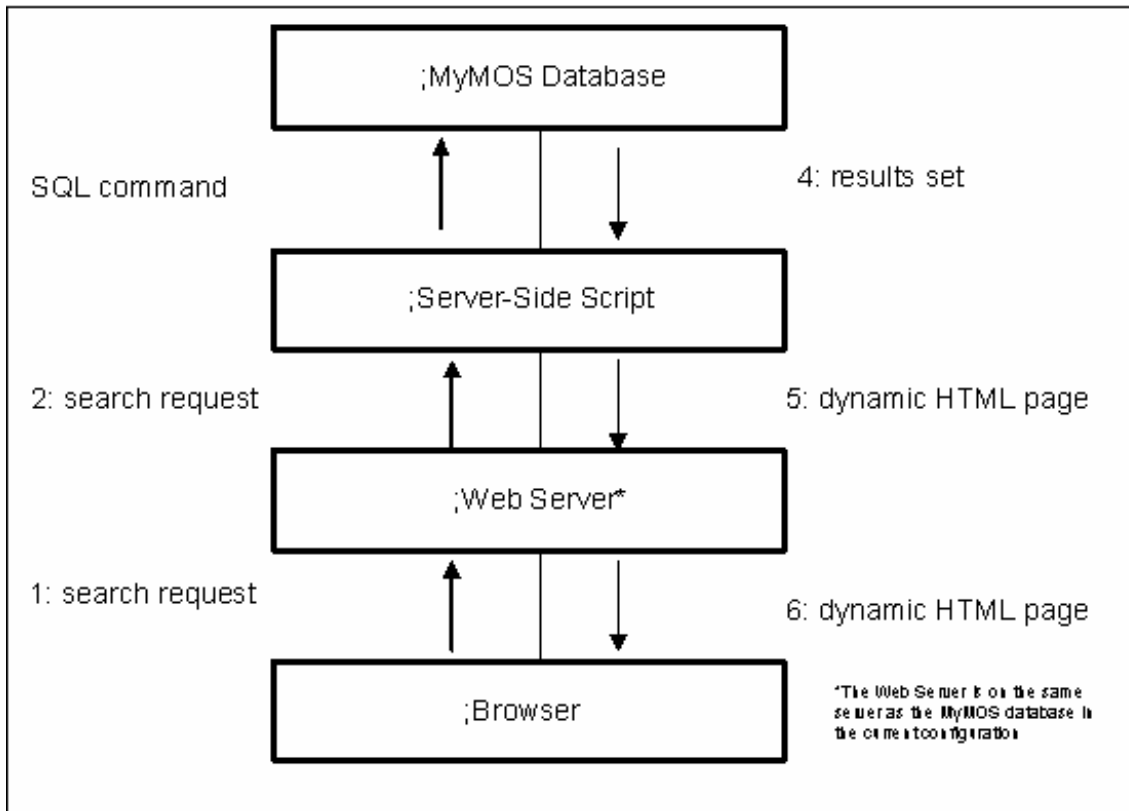


Figure 1 Data Flow Diagram.

2. The Entity Relationship Diagram is Displayed in Appendix C.

E. SYSTEM DESIGN PHASE

1. Concept to Creation

As previously stated, the primary mission of TBS is to educate newly commissioned officers and prepare them for duty as a company grade officer in the operating forces with particular emphasis on the duties, responsibilities, and warfighting skills required of a rifle platoon commander. In order to accomplish this mission, nearly all the officers at TBS have a combat arms background. There is little to no emphasis placed on educating the

lieutenants in information technology skills. The system we created had to be relatively easy to use, quick to learn, and require little to no training for the end users. We wanted it to be accessible to the lieutenants from home so that they could peruse the knowledge base at a time of their choosing and for married officers to share that knowledge with their spouses.

We developed a menu-driven system almost identical to that used by TBS and in accordance with Marine Corps Standards.¹⁵ This format increased user familiarity with the interface and minimized the ownership costs, e.g., porting the site to TBS and periodic maintenance. We modeled reports after those currently used by The Basic School Staff in order to increase acceptance and reduce training costs associated with implementation of a new system¹⁶. A good example of this practice is the MOS Choices report. Not only does this report have the look and feel of the existing spreadsheet, but also it can be highlighted using click and drag technique, copied, and pasted into a MS Excel spreadsheet. This capability provides the staff with the same product that currently takes hours to complete in just a few seconds.

2. User Analysis

Surveys of the lieutenants combined with consistent coordination with the company staff allowed us to measure user satisfaction with the current MOS education and assignment system. Detailed analysis of the surveys are contained in Appendix E.

¹⁵ Website, <http://www.hqmc.usmc.mil/webstandards/>

¹⁶ TBS Documentation contained in Appendix B.

3. Resistance to Change

The goal of this project was to develop and deploy an operational system. A significant issue, which we addressed continually, was our expectation for resistance to change within the TBS staff. Concern for this project centered around two areas. First, we expected the staff would be unwilling to accept an electronic version of the MOS choices instead of the current paper method, which has existed for the last 30 years. Secondly, and of far greater concern, was the resistance we were confident would be shown toward the use of the optimization algorithm. This is addressed in more depth later, but clearly, a significant amount of authority lies with the SPCs regarding the MOS Assignment process. We knew there would be significant resistance to any perception of allowing a computer to decide the MOS assignment of a lieutenant. By launching a political, marketing, and military IT campaign, we were able to forge alliances and work with leading customers.¹⁷

Specifically, our first step was to forge an alliance with the command element of TBS. By doing so, we guaranteed a certain level of support from our test company. By continually feeding the executive officer with updates and examples, we were able to maintain the necessary level of command support. By partnering ourselves with Alpha Company before development began, we created a "beachhead" within TBS that provided a base by which to "sell" the project to other members of the organization. Additionally, having Alpha Company

¹⁷ L. Hirschhorn, "Campaigning for Change", 2002.

intricately involved in the development linked them to our success or failure. We knew they would not want to see a project they were associated with fail; therefore they provided us with a supply line of interest and support.¹⁸

We knew, or at least felt strongly, that the lieutenants would be a source of support for the project. We believed as the system's existence flourished, word would spread rapidly beyond Alpha Company, and lieutenants from other companies would ask for access to the full range of features offered by MyMOS. In fact, initial feedback from the lieutenants of TBS was supportive of the system, especially the reports section.¹⁹ This grass-roots support was part of our overall campaign to gain acceptance by the staff platoon commanders.

Finally, it is important to note that when possible we purposely duplicated the format of documents and reports currently used by TBS in the MOS assignment process. In a further effort to gain acceptance, the systems construction allowed for the migration of data from the web interface to legacy spreadsheets with a minimal amount of effort. By utilizing the existing format and minimizing the effort involved in migration of the data, we further enhanced the chance for system acceptance. While improvements in content and format are achievable when developing and deploying a new system, one usually incurs an additional level of resistance when attempting to do so. In fact, if the improvements are too radical the end user is likely to deem the system unfriendly or hard to read. The lack of

¹⁸ Ibid.

¹⁹ Reference Email feedback from lieutenants of Alpha Company.

extensive reports incorporated into the existing MOS assignment process allowed us to duplicate the legacy system's output without degrading the utility of the system. In fact, the lack of informational reports in the existing process is one of its drawbacks. The addition of reports that assist in the decision making process will be addressed in Chapter III.

4. Training

The system design attempts to minimize the amount of training necessary for operation and maintenance. The decision to utilize a web browser interface, rather than directly accessing the database, was an intentional decision to minimize training requirements. Chapter V is the user's guide for students and staff. It presents a picture of each page, the page's purpose, and basic instructions on its use. It is assumed that users are familiar with Microsoft Internet Explorer 5.0 or later.

F. OPERATIONS AND MAINTENANCE PHASE

At the completion of this thesis, the project will enter the operations period where the system will undergo deployment and operations/maintenance²⁰.

We created the website on the SEABEEONE server located at the Naval Postgraduate School, and it is accessible via the World Wide Web. The intent of this project is migration of the website and database to a server administered by TBS. For the period of development and testing, it was necessary to host the project on a site where we had administrative control of the server. Although it is feasible to leave the system on the

²⁰ K. Forsberg, Visualizing Project Management 2nd Ed., p. 83.

SEABEEONE server, since it is accessible via the Internet, it is neither necessary nor recommended. Once operational, the system should reside on a TBS-controlled server behind the TBS firewall.

The SEABEEONE server exists for educational development and does not have a long-term administration or support plan. Additionally, placing the system on a TBS server will allow for an additional level of security since it will be located behind the TBS firewall, if that is deemed necessary. The desire is that the system not be located behind a firewall that prohibits access. One of the stated goals is to provide access while off-duty or for spouses to review. Ideally, the website should be hosted on a web server and the database on a data server; thus a true three-tier design²¹ would be implemented. This configuration would most likely realize some processing improvements. However, this design was not practical for the project due the limited resources. In all likelihood, TBS will employ the same two-tier architecture used for the purpose of this thesis.

Operation and maintenance of the system is still a point of discussion at TBS. We have spoken with the TBS S-6 and it is anticipated that a full migration of the website and database will occur in the summer of 2003. TBS possesses personnel with the necessary skills to maintain both the Access database and the Active Server Pages.

²¹ D. Kroenke, Database Processing Fundamentals, Design and Implementation, p. 410.

G. DATABASE INITIAL STUDY

The lack of an existing MOS assignment legacy system was a benefit. The closest entity to a formal decision support system used by the company staff was the Microsoft Excel spreadsheet that the Company Executive Officer created from the 3" x 5" cards. Without the requirement to integrate into a legacy system, we were not constrained in our develop process.

With this in mind, the project focused on developing a schema which maximized data integrity and enforced the highest level of normalization acceptable within our Active Server Page web interface²².

H. DATABASE DESIGN PHASE

1. Access

We choose Microsoft Access for the database. Access was a logical choice for a number a reasons. First, TBS has already deployed MS Access and the Navy Marine Corps Intranet (NMCI)²³ supports it. We evaluated the use of Microsoft's SQL Server, but dismissed this after learning that TBS did not possess a SQL Server license or a qualified SQL Server administrator.²⁴ SQL Server would have provided for additional security measures not available in MS Access, but utilization of it may have precluded TBS from implementing the final product. It is improbable that TBS would have spent the fiscal resources

²² Ibid, pp. 127-137.

²³ Websitehttp://www.eds-gov.com/nmcifaqs/nmcifaq.asp?f_cat=10 NMCI Taskforce Website April 2003.

²⁴ Reference a phone conversation with the TBS S-6 officer, Jan 2003.

necessary to purchase the license, obtain the hardware, and train the administrator.

Although not as powerful as SQL Server, MS Access can handle the multi-user environment necessary for this system.²⁵ The training cycle for companies at TBS is staggered throughout the year, thereby reducing the number of potential concurrent users. In addition, Access is very scalable and can easily be upgraded to SQL Server if the need arises or is preferred.

A data model created for IS4925 (E-Commerce) was used as a basis for the construction of the MyMOS database. Using the data model from IS4925, we created storyboards for the website to account for the functionality that would be necessary to support the lieutenants and the company staff. Our previous work on the concept and the storyboards reinforced our hypothesis that two significant entities would dominate the data model: one capturing the information regarding each MOS and the other capturing the data regarding each Marine lieutenant. Following the creation of these two entities, the subsequent support entities followed quickly.

The data model necessary to support the MyMOS decision support system is relatively simple. The majority of discussion regarding the data model focused on the many-to-many relationships. Two key questions arose: were the many-to-many tables necessary, and could Active Server Pages support add and delete capability in a many-to-many relationship. Another point of discussion was the use of Social Security numbers. The inclusion of SSNs in the

²⁵ I. Blackburn, Access 2000 Programming, p. 9.

database would intensify our security issues. Without the SSNs, the database contained little, if any, sensitive information. Ultimately, we decided not to store SSNs within the database.

2. Data Model

With the knowledge gained in our IS4925 class, discussions with the TBS staff, and our personal experience with the MOS assignment process, we identified the desired MOS and personal data which needed to be collected. Each table links through its association to the Marine or the Military Occupational Skill. In the case of the survey tables and the website feedback table, we identified the requirement after the initial database schema was in place. These tables emerged because of secondary requirements, such as the necessity to conduct a survey. Their inclusion into the database was not essential to the operation of the system. The removal of these tables from the database may be possible after operational deployment.

Two significant areas comprise the data: MOS information and lieutenant information. We do not consider the survey or feedback tables major areas since their existence is not essential to the proper functioning of the system. The MOS information contains such items as the occupational category, job description, duties, and Department of Transportation classification. The officer table contains administrative data such as platoon, contract, password, and MOS assignment information. The following provides additional information on each table.

a. OFFICER. The purpose of this table is to capture data on individual officers.

b. MOSMAIN. The purpose of this table is to capture information on each MOS. Additionally, this table defines whether an MOS is available only to males, or to both males and females.

c. OFFICER_MOSMAIN. This table captures the numerical choice of each MOS for each lieutenant.

d. MOSMEDIA. This table contains the addresses of media. The media can be in the form of pictures or video for associated MOSs.

e. FAQ. This table provides the frequently asked questions and their respective responses for each MOS.

f. MOSASSIGNMENTNUMBERS. This table contains the distribution of MOSs into the top, middle, and bottom third.

g. OFFICER_SURVEY. This table contains the answer to each survey question by each lieutenant.

h. SURVEYQUESTIONS. This table contains the questions for each survey.

i. SURVEY. This table contains the start and stop date of each survey as well as the survey name.

j. WEB_SITE_FEEDBACK. This table contains the information submitted for feedback via the website. If an officer logs into the system before he or she submits feedback, the table captures the officer's name, rank and email, as well as the date submitted and the browser used.

I. DATABASE IMPLEMENTATION AND LOADING PHASE

By utilizing Microsoft Access, which contains both the database and the database management system (DBMS), we avoided the need to identify a separate DBMS.²⁶ The database was initially populated with historical data provided by TBS. This proved to be extremely useful as it acknowledged the need to identify naming conventions in order to enforce consistency within the database. For example, the contract status for ground assignable officers was "Ground" for one company and "GRND" for another company. Additionally it highlighted the need for data integrity. On our initial data import, we found more than 20 instances of incorrect MOS data, e.g., lieutenants with an MOS choice of 3402, which doesn't exist. The use of historical data allowed the testing of functional aspects of the website and database with the same data utilized during implementation and operation.

After loading and cleaning the historical data, we were able to develop an initial web interface that allowed us to test add, modify, and delete functionality. Furthermore, the historical data enhanced the identification and development of queries and reports necessary for supporting the staff and lieutenants. This assisted us in gaining the approval of our customers. Additionally, it allowed us to integrate them into the design and implementation of the system quickly. TBS could rapidly see the results of our work and provide feedback early in the design phase, which ultimately minimized our development costs.

²⁶ D. Kroenke, Database Processing Fundamentals, Design and Implementation, p. 30.

J. TESTING AND EVALUATION

As previously stated, development of the web interface and database was concurrent. This was essential for the testing of the database since virtually all database transactions are via Active Server Pages. We conducted initial testing of the database by utilizing the historical data provided by The Basic School. Using the verification analysis and resolution process,²⁷ we systematically built entities to meet the needs identified in our requirements analysis phase. By initially testing the database in this manner, we were able to verify the database schema and the the Active Server Page code and connections.

1. Testing

Verification was conducted through testing. Initial tests focused on adding, modifying, and deleting data from the database via the Active Server Pages. To prevent compromise of our production system, we conducted verification testing on our laptop computers.

Formal, qualification, and acceptance testing was conducted by members of the TBS staff on the production system. We notified the executive officer by email or telephone of the new feature. Subsequent test results and feedback via email allowed us to make any necessary changes.

2. Evaluation

Since the user never actually saw the database or data structure, evaluation occurred using the website.

²⁷ K. Forsberg, Visualizing Project Management 2nd Ed., p. 126.

K. OPERATIONAL PHASE

This system is intended to enter an operational phase upon completion of development. While there may be some follow-on work available, it is our intent to provide a production level decision support system not dependent upon further design and development.

1. Deployment

It is our goal to accomplish deployment prior to 15 June 2003. Initial conversations with the customer indicate their desire to deploy the system for full-time use. Deployment will consist of transferring the database TBS data or web server under their administration.

2. Operations

This system will enter an operational deployment phase upon conclusion of this project. As of this writing, Alpha Company is using the system for MOS education and assignment. Additionally Bravo and Charlie Companies have begun negotiation for their use.²⁸ Operational consideration should be given to archiving historical data. Archiving will improve the response time of the system and provide a historical record for subsequent data mining²⁹.

²⁸ Reference email from LtCol Shusko, April 2003.

²⁹ K. Laudon, Management Information Systems, p. 592.

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III. WEB INTERFACE DEVELOPMENT

A. WEB INTERFACE DEFINITION

1. Disclaimer

This thesis and this chapter in particular, do not attempt to teach internet applications or protocols. Where necessary, we provided detailed explanations, but we assume that the reader possesses a basic understanding of internet technology.

2. Design Scope

The design of the web interface was significant in both scope and effort. In order to overcome the resistance that is natural to a new application, we purposefully designed and based the principal interface for MyMOS on the web browser. While MyMOS uses a database at its foundation for maintaining information, we knew it was not likely to be adopted if we packaged and presented the system with a database GUI. Additionally, benefits such as universal accessibility would not be available if we produced the application using the graphical user interface (GUI) available in Microsoft Access. While application development in MS Access would have proceeded more quickly and most likely resulted in more functionality, the benefits of a web interface, e.g., accessibility, acceptability, training, etc., outweighed the advantages of an Access interface. Two subjects dominated our development: graphical user interface and Active Server Pages.

a. Graphical User Interface

(1) Design. The primary influence for our design came from the TBS website.³⁰ We used the colors, graphics, and layout from that site. We knew the application, if adopted by TBS, would be accessed through their website and that by matching their GUI we would minimize costs associated with deployment to the TBS server. Additionally, this GUI was already familiar to the staff and students and would be more readily acceptable.

The second major influence on our design came from the U.S. Marine Corps. In accordance with Marine Corps Order 5720.76, all publicly accessible web pages must have a standardized functionality, appearance, and uniformity. By adhering to the requirements stipulated in the Order, we maintained a consistent look and feel throughout the web site.

(2) Capabilities and Limitations. Both of us had taken IS4925 (E-Commerce) and were familiar with the technical aspects of developing a multi-tiered architecture. Additionally, we had both taken IS3020 (Software Design), and were familiar with the aspects of software engineering, but we were without any practical experience.

Beyond our own limitations, we faced a customer who did not understand our capabilities and limitations and whose vision for the application's functionality and interface was unknown. This limitation would eventually be a significant influence on our application development process.

b. Active Server Pages

Active Server Pages provide a model solution to developing a multi-tiered application. First, they eliminate the need to worry about the client, since the server executes all of the rules. Secondly, the data is afforded an additional level of security because the client never actually accesses the database. The server executes the code necessary for retrieving, modifying, adding, and deleting the data.

As previously mentioned, TBS falls under the auspices of NMCI. As such, Internet Explorer is their mandated web browser.³¹ Therefore we used Explorer to develop and test the Active Server Pages. We understand that there may be customers who are not utilizing Explorer from their home, but development time did not allow for support for multiple browsers and access to Explorer is nearly ubiquitous.

B. WEB INTERFACE REQUIREMENTS

We developed our functional requirements as we conducted our research and development. Since the customer did not possess or utilize a legacy decision support system, we primarily defined interface requirements through a series of "beta" pages, which demonstrated functionality.

Central to the application was the ability to add, modify, delete, and display records and data. Intricately interwoven into this capability was the requirement that the application recognize who was using it and filter the capabilities of that user based on a security level.

³⁰ Website, <http://www.tbs.usmc.mil>

³¹ Website, http://www.eds-gov.com/nmcifaqs/nmcifaq.asp?f_cat=7

C. WEB INTERFACE DESIGN

1. Strategy

Initially, our strategy for the design of the application was the development a simple web interface that presented the MOS information to the students and the MOS information and selective reports to the staff. Due to funding constraints, we were not able to travel to TBS and directly interview the students and staff members. We relied on our phone conversations with the XO of Alpha Company, our own experience, and feedback from other students at NPS.

Our design schedule had a significant impact on our development strategy. Under less constrained situations, we would have probably adapted the Waterfall Process Model.³² This model would have allowed us to perform extensive requirements analysis, design, implementation, integration, and testing. However, we chose to use the Spiral Process Model because we needed to build an early partial version of the product that we could show to the customer and use to obtain feedback.³³ Our timeline for application development began in January and required a functioning prototype of the application by mid-March. Figure 2 shows the Spiral Process Model.³⁴

³² E. Braude, Software Engineering, An Object-Oriented Perspective, p. 24.

³³ Ibid, p. 26.

³⁴Website, <http://www.ics.uci.edu/~wscacchi/Software-Process/Images/Spiral-Model-Boehm-1987.gif>

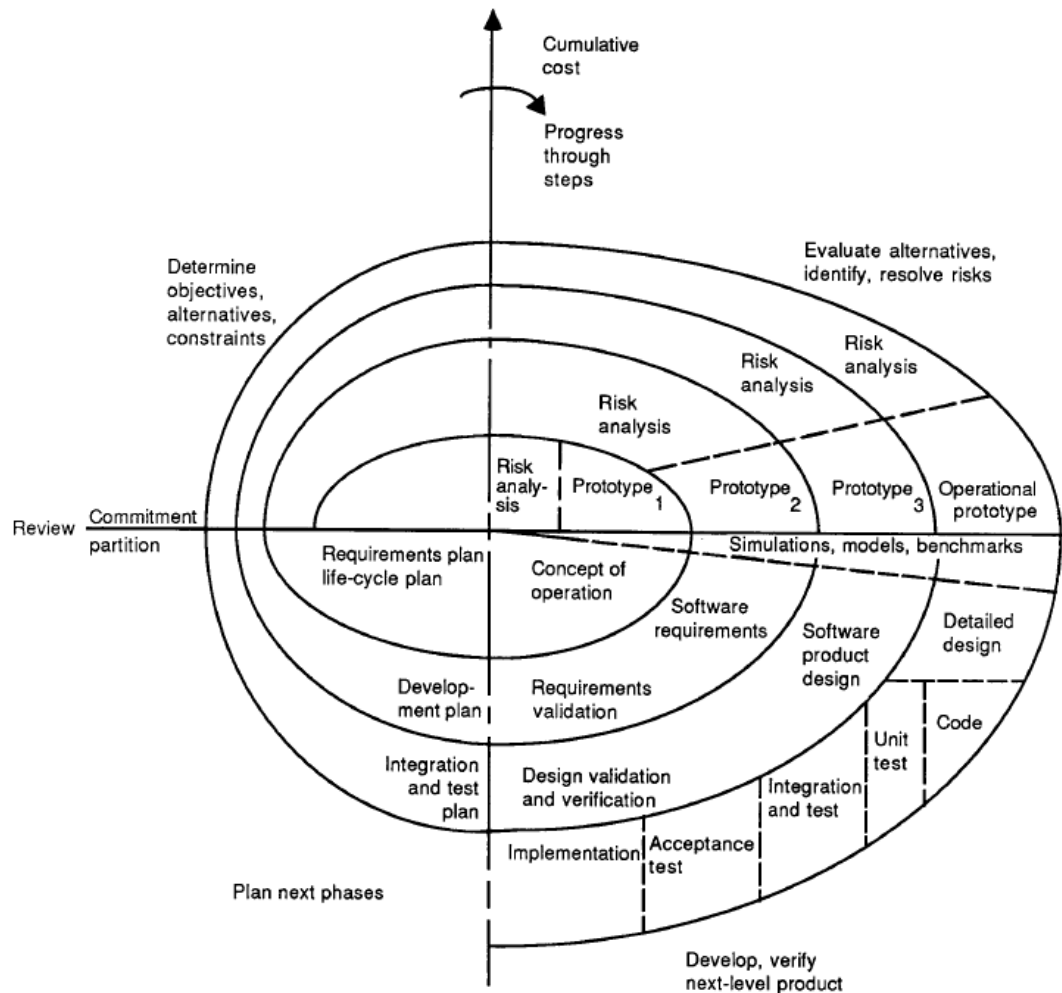


Figure 2 Spiral Process Model.

By building a rapid prototype of the application, we were able to obtain the customer requirements and identify and eliminate risky parts of the application.³⁵ Although prototyping is intended for large programs, it allowed us to identify risks early and provide the customer with a demonstration of our capabilities. By utilizing the spiral methodology, we were able to “evolve” our prototype into a working application.

2. Practical Application

We utilized the Naval Postgraduate School SEABEEONE server for the development, testing, and hosting of the MyMOS website. This proved beneficial from several aspects, the most significant of which was the fact that we were the administrators for the SEABEEONE server and could quickly troubleshoot problems. Secondly, we had constant access to our data and the comfort of knowing that reconfiguration of the server could not occur without our knowledge.

The use of session variables enhanced our enforcement of the website and database security. By utilizing session variables, we were able to control both the pages that a user could access, and the menu that a user saw when logging in. Additional information regarding the use of session variables and menu control occurs further in this chapter.

3. Significant Design Aspects

a. Users

We designed the MyMOS website for use by four different levels of users. The lowest level of user is "Anonymous." This user is not required to have a user name or password. All other users, "Student," "Staff SPC" and "Staff CO/XO" are required to possess a username and password. Access to various reports and capabilities are dependent upon a user's level of access. This topic is covered in greater depth in Chapter 5 during the discussion on menus.

³⁵ Ibid, P. 161.

b. Default Homepage

Figure 3 shows the default home page for MyMOS. Anonymous users have access to the Process Information, MOS Information, Career Path, and Frequently Asked Questions (FAQs) pages. Additionally, anonymous users have access to general information about the MyMOS project and the thesis members. Finally, anonymous users have the capability to report problems via the "Report A Problem" link.

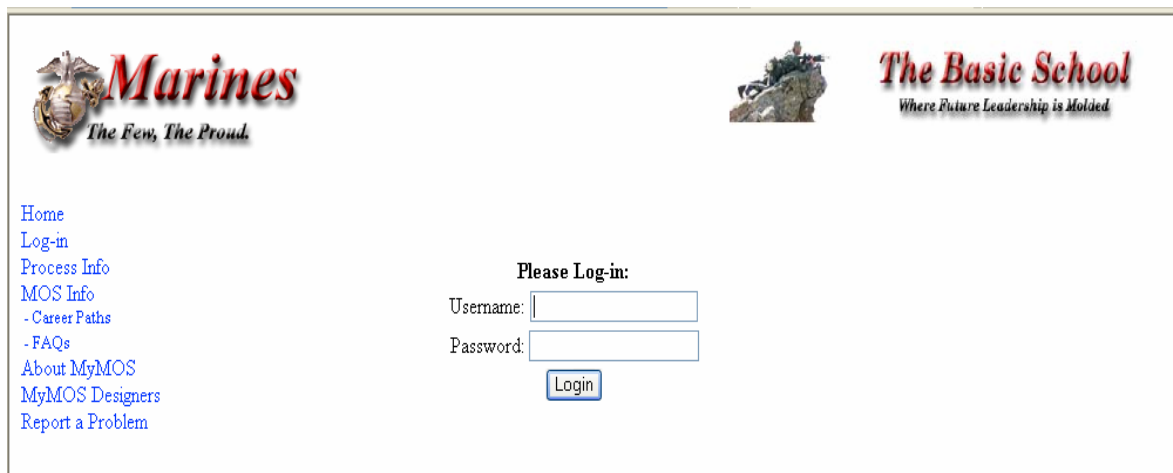


Figure 3 MyMOS Home Page.

c. Login Procedures

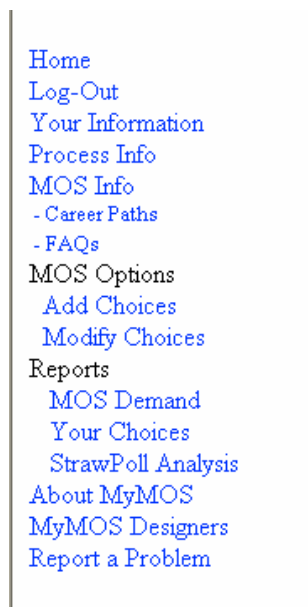
Students, SPCs, and the executive and commanding officer will have the ability to login to MyMOS. Using the login page illustrated in Figure 4, users will identify their username and password. The system will identify the level of access based on the user's username and password, assign the appropriate session variable, and present the proper menu. Figure 5 is the menu for students. Figure 6

is the menu for staff platoon commanders and Figure 7 is the menu for the executive and commanding officer.



The image shows the MyMOS Login Page. At the top left is the Marine Corps logo with the text "Marines" in a large, stylized font and "The Few, The Proud." below it. At the top right is a small image of a Marine on a tank with the text "The Basic School" in a stylized font and "Where Future Leadership is Molded" below it. On the left side, there is a vertical list of links: Home, Log-in, Process Info, MOS Info, - Career Paths, - FAQs, About MyMOS, MyMOS Designers, and Report a Problem. In the center, there is a login form with the heading "Please Log-in:". Below the heading are two input fields: "Username:" and "Password:". Below the "Password:" field is a "Login" button.

Figure 4 MyMOS Login Page.



The image shows the MyMOS Student Menu. It is a vertical list of links: Home, Log-Out, Your Information, Process Info, MOS Info, - Career Paths, - FAQs, MOS Options, Add Choices, Modify Choices, Reports, MOS Demand, Your Choices, StrawPoll Analysis, About MyMOS, MyMOS Designers, and Report a Problem.

Figure 5 MyMOS Student Menu.

- Home
- Log-Out
- Your Information
- Process Info
- MOS Info
 - Career Paths
 - FAQs
- Reports
 - MOS Distribution
 - MOS Demand Count
 - MOS Demand Name
 - MOS Choices
 - MOS Assignment
 - Pivot Chart
 - (NPS Intranet Only)
 - Counseling
 - Supply vs Demand
 - StawPoll Analysis
- About MyMOS
- MyMOS Designers
- Report a Problem

Figure 6 MyMOS SPC Menu.

- Home
- Log-Out
- Your Information
- Process Info
- MOS Info
 - Career Paths
 - FAQs
- Reports
 - MOS Distribution
 - MOS Demand Count
 - MOS Demand Name
 - MOS Choices
 - MOS Assignment
 - Pivot Chart
 - (NPS Intranet Only)
 - Counseling
 - Supply vs Demand
 - StawPoll Analysis
- CO/XO
 - Admin Menu
 - Assignment Menu
- Final Reports
 - Quality Distribution
 - Statistics

Figure 7 MyMOS CO / XO Menu.

Secure Socket Layer (SSL) is not enabled on the SEABEEONE server because it is an educational development platform. TBS possess a secure certificate and operates SSL on their web server. When MyMOS migrates to the TBS server log-in will occur in a secure environment.

d. Menu Options

System functionality increases with the level of user permission. Table 3 summarizes user accessibility to pages.

Menu Option	Anonymous	Student	SPC	CO/XO
Home	x	x	x	x
Log-in/out	x	x	x	x
Your Information		x	x	x
Process Information	x	x	x	x
MOS Information	x	x	x	x
Career Paths	x	x	x	x
FAQs	x	x	x	x
Add Choices		x		
Modify Choices		x		
Reports Information		x	x	x
MOS Distribution			x	x
MOS Demand Count	x	x	x	x
MOS Demand Name			x	x
MOS Choices		x	x	x
Pivot Chart			x	x

Counseling			x	x
Supply vs. Demand			x	x
Straw Poll Analysis		x	x	x
Admin Menu				x
Assignment Menu				x
Quality Distribution				x
Statistics				x

Table 3 User Menu Accessibility.

Presented below is an overview of the functionality afforded each user level. Chapter V discusses the specifics of individual web pages.

e. User Features

(1) Anonymous User. Anonymous users can review the MOS assignment process. Additionally, they can read the detailed MOS information and frequently asked questions for each assignable MOS. Finally, anonymous users have the ability to report a web site problem. Anonymous users can provide their name and email. While not necessary, this allows the web master to respond to questions or problems. For users who are logged-in, e.g. SPCs, the name and email boxes are neither visible nor necessary since the session variable captures it automatically.

(2) Student. Students have access to all the same information that anonymous users have, but students also have the ability to enter and modify their MOS choices as well as view select reports. Reports are available which provide information to assist students in

making decisions regarding their MOS choices. For example, the straw poll analysis report identifies the lineal number of the student logged-in and the lowest lineal number of a student assigned each MOS. This allows students to decide if they have an opportunity for an MOS assignment based on lineal standing. The authors realize that access to this information may lead to "self-selection" among the lieutenants. In fact, this self-selection is a desired feature for the staff of TBS.³⁶

(3) Staff Platoon Commanders have access to all the information afforded anonymous users. In addition, they have access to a series of reports which provide information that supports the MOS assignment process. For example, the "Supply vs. Demand" report shown in Figure 8 provides an analysis of the demand for an MOS compared to the supply.

MOS	Total Supply	1st Choice Demand	1st Choice Demand Minus Supply	Top 5 Demand	Top 5 Demand Minus Supply
3002	3	0	-3	1	-2
0180	2	0	-2	1	-1
7210	0	0	0	0	0
7208	0	0	0	2	2
6002	1	0	-1	3	2
6602	1	1	0	3	2
3404	1	0	-1	4	3
7599	1	5	4	5	4
7580	1	1	0	5	4
7220	0	0	0	7	7

Figure 8 Example Supply vs. Demand Report.

This report provides visibility to recognize MOSs with low demand. Staff members can then use this knowledge to

³⁶ Conversation with a staff member at TBS, Feb 2003.

assist the support of the occupational field sponsor or others to highlight the benefits of the MOS.

(4) The Commanding Officer / Executive Officer menu affords access to everything the SPC menu provides. Additionally, two other significant features are provided to the CO/XO. This menu affords access to the quality distribution and statistical analysis reports. Both reports present a statistical analysis of the MOS assignments and replace the current reports. Currently, the company staff manually compiles the statistics following the MOS assignment process. In addition to eliminating the manual computation of the statistics, the MyMOS reports provide real-time visibility throughout the MOS assignment process, allowing the CO/XO to view the impact of changes as they occur.

In addition to the reports, the CO/XO menu provides access to the Admin Menu and the Assignment Menu. The Admin Menu, illustrated in Figure 9, provides access to administrative functions via the web interface, eliminating the need to perform record maintenance in the Microsoft Access application. This is a further example of the effort to increase acceptance by performing virtually all tasks within the browser interface.

The Assignment Menu, shown in Figure 10, provides the CO/XO with those functions necessary to assign the MOSs to the lieutenants. This page offers the CO/XO alternative assignment algorithms in order that they might compare the different assignment methodologies.



Figure 9 CO/XO Admin Page.



Figure 10 CO/XO MOS Assignment Menu.

D. IMPLEMENTATION

The SEABEEONE server hosts the web interface. The SEABEEONE server is running IIS 5.0, the same internet software used by TBS. This implementation supported our

desire to minimize the cost of deployment to TBS upon completion of our thesis work.

E. TESTING AND EVALUATION

As previously stated, the web interface design occurred concurrently with the database. Initial testing of the web interface occurred prior to posting on the SEABEEONE server. Utilizing the same verification analysis and resolution process employed with the database design, we systematically constructed web pages to meet the customer needs identified in our requirements analysis phase.³⁷ In this manner, we simultaneously verified the database schema, the Active Server Page code, and connections.

1. Testing

As with the database design, verification and testing occurred in concert with one another. In order to separate our production product from our test bed, we configured our laptop computers to run Internet Information Server (IIS) 5, and we mirrored the folder structure and files of the production site on our local hard drives. This facilitated design, engineering, and informal testing without affecting the production system. This methodology supported concurrent construction of web pages as delineated in our division of labor. After successful completion of engineering and informal testing, the integration of new features or components into the production system occurred on the SEABEEONE server.

³⁷ K. Forsberg, Visualizing Project Management 2nd Ed., p. 126.

Members of the TBS staff and students at NPS conducted the formal, qualification, and acceptance testing on the production system.

2. Evaluation

The concurrent development of the database and web interface allowed the customer to evaluate the system as a single entity and provide meaningful feedback during iterations of the spiral.

F. OPERATIONAL PHASE

This system is intended to enter an operational phase upon completion of development. It is our intent to minimize the costs of deployment and operations. To that end, we intentionally selected MS Access and the use of Active Server Pages, which are editable with FrontPage.

1. Deployment

As previously stated, it is our goal to accomplish deployment prior to 15 June 2003. Deployment will consist of transferring the web interface to a TBS server. The Basic School is currently running an IIS 5 server, and deployment should be able to be accomplished with one to two man-days of work.

2. Operations

The design of the web interface incorporates our desire to minimize the operational costs of this system. The interface facilitates the addition, modification, and deletion of data to support routine operations.

G. MAINTENANCE

Maintenance is the process of modifying a software system or component after delivery to correct faults,

improve performance or other attributes, or adapt to a changed environment.³⁸ To this end, the MyMOS web interface design minimizes maintenance costs. Virtually all data is maintainable through the web interface, thereby reducing the need for a database administrator. All of the web pages are editable using standard web authoring tools, such as Microsoft's FrontPage. This is possible since all pages were written in standard HTML.

In-house representatives currently employed by TBS can perform routine maintenance right now. As with the database, we would recommend that significant overhaul or restructuring occur at the Naval Postgraduate School as thesis or independent study work.

³⁸ E. Braude, Software Engineering, An Object-Oriented Perspective, p. 481.

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IV. OPTIMIZATION

A. MOTIVATION FOR A COMPUTER MODEL

1. Existing Process

The existing MOS assignment process requires three elements of data: the lieutenant's MOS choices, the MOS quotas for each one-third of the company, and the lineal standing of the lieutenant.

a. MOS Distribution

The Officer Inventory Officer (OIO), Manpower Plans, Manpower and Reserve Affairs, HQMC, assign the number of MOSs for each company. The company commander distributes the MOSs assigned by the OIO into thirds. For example, a company may be assigned 24 slots for the infantry MOS (0302) from the OIO. The company will then distribute these into thirds, most likely eight to each third. In those cases where the number of slots is not equally divisible by three, the distribution is at the company commander's discretion. Ultimately, the commander strives to keep the total number of MOSs in each one-third as equal as possible. Table 4 is an example of a company's MOS distribution.

MOS	Top	Middle	Bottom	MOS	Top	Middle	Bottom
0180	2	3	2	3002	3	3	3
0203	3	2	1	3404	1	1	2
0204	1	0	1	4302	0	1	0
0206	2	1	2	5803	1	1	0
0207	2	1	2	6002	1	0	1
0302	9	9	9	6602	1	1	1
0402	4	3	5	7204	0	1	0
0602	8	7	9	7208	0	1	1
0802	6	5	5	7210	0	1	1
1302	2	3	1	7220	0	1	1
1802	1	1	1	7580	1	2	0
1803	1	1	1	7599	1	2	1

Table 4 MOS Distribution.

This technique of dividing a company into thirds is an attempt to maintain a "quality spread" of officers into the MOSs. This distribution prevents the best performers from filling the most popular MOSs. The infantry and administrative MOSs are good examples. Traditionally the infantry MOS is the most popular and the administrative MOS is one of the least popular. Distributing the MOSs into thirds ensures a quality spread and an equitable opportunity for a particular MOS.

Since TBS teaches rifle platoon skills, a combat arms MOS, it is the authors' belief that officers who enjoy the combat arms MOSs tend to perform better at TBS. This leads to a higher percentage of those officers in the top one-third desiring a combat arms MOS. Consequently, those officers in the bottom one-third tend to desire more combat service support MOSs. Because of this perception we investigated the effect of loosening the one-third constraint and the effect that would have on quality.

b. Lineal Assignment

Prior to MOS assignments, the company staff receives the lineal ranking of each lieutenant based on his or her grades. Those lieutenants with aviation and law contracts are removed from the lineal rankings since they are guaranteed an MOS. Then the company is divided into thirds. The division point for each third is based on the number of MOS quotas assigned to each third during the MOS distribution. For example if the distribution of MOSs was 44/45/44 (top/middle/bottom) then the top 44 lieutenants would be assigned to the top one-third, the next 45 lieutenant to the middle one-third and the final 44 lieutenants to the bottom one-third.

c. MOS Assignment

With the lineal standings, MOS quotas for each third, and MOS choices in place, the company starts to assign MOSs to individual officers. Assignment is accomplished by taking the top officer (of each one-third) and looking at his or her number one choice. If that MOS is available within the one-third of containing that officer, then he or she receives his or her first choice. If that MOS is not available, the staff repeats the procedure for the officer's second choice. This process is continued until the officer has been assigned an MOS. The staff then goes to the next officer on the lineal list (within the one-third) and performs the same procedure described above. Unfortunately, this process usually results in those officers at the bottom of their one-third getting the MOSs that no one else wanted.

A business rule of TBS is to attempt to assign 88% of the lieutenants' to one of their top five choices. In order to accomplish this, the company staff is allowed to "trade" assigned MOSs amongst officers. For example, suppose an officer got his second choice (logistics) and his fourth choice was communications. Further, suppose that another officer received his tenth choice (communications) but that his third choice was logistics. If both officers are within the same one-third, the staff could elect to trade the MOS's assigned to each officer, allowing each to receive a top five choice.

Officers whose lineal ranking places them within the top ten percent of the company may not have their MOSs traded. This business rule ensures an officer who has performed exceptionally well gets the highest MOS choice available to him or her.

2. Analysis of the Problem

The current assignment process is not entirely broken. However, it is overly time-consuming and lacks consistency among the companies. Also, the current process fails to leverage the capability of linear programming and advancements in computer processing. In addition to providing a powerful modeling tool, this analysis allows us to determine the relevant constraints, variables and data. In doing so we are able to quickly reveal alternatives and analyze the impact of changing or eliminating constraints.

Finally, by modeling the MOS assignment problem we are able to capture the business rules and processes that must be relearned with every rotation of the company staff.

This model will provide a consistent, timely, starting point for the decision maker.

B. MODEL DESCRIPTION

Each MOS assignment model is an integer linear program that optimally assigns MOSs to TBS lieutenants. It minimizes the cumulative choice number assigned to each officer while accounting for TBS business practices.

The model accounts for a lieutenant's class standing, MOS preferences, third and MOS availability. This chapter contains the mathematical representation of the optimization model. Appendix D contains a graphical representation of the optimization model. Implementation of the model was performed using Microsoft Excel in conjunction with two commercially available optimizers³⁹. Excel was configured to pull the lieutenant data from the Access database, and Solver was used to perform the optimization process. All three optimization models were performed in the same manner. The only changes involved the loosening of constraints as shown in Table 5.

1. INDICES

i	TBS Marine Ground Assignable Lieutenant (1 - 50)
j	MOS's (1 - 23
wc	Weighting Constant
am	Available MOS's

2. DATA

(wc)	The weighting constant is calculated by dividing the Lt's class standing by the total number of ground assignable Lt's plus their choice for a
------	--

³⁹ www.solver.com Premium Solver Platform V5.0 & XPRESS Solver Engine

particular MOS divided by the total number of available MOSs.

(wc) X_{ij} The numerical desire of Lt (i) to get MOS (j).

3. VARIABLES

X_{ij} 1 if Lt i is assigned to MOS j, 0 otherwise.

am_j Number of MOS's available for MOS (j)

4. OBJECTIVE FUNCTION

$$\min \sum (wc) X_{ij}$$

5. CONSTRAINTS

$$\sum_{j=1}^j X_{ij} + X_{i(j+1)} = 1, \text{ for all } i$$

MOS Assignment constraint. Each Lt can only be assigned to one MOS.

$$\sum_{i=1}^i X_{ij} + X_{(i+1)j} = am_j, \text{ for all } j$$

MOS constraint. The available MOS for each company.

$$X_{ij} \geq 0, \text{ for all } i \text{ \& } j$$

Non-negativity constraint.

The objective function is a measure of each lieutenant's MOS choice satisfaction, on a scale of $\approx 0 - 2$. The first lineal lieutenant receives his or her first choice contributes almost zero to the objective function, where a two represents the last lieutenant's last choice. Therefore the optimal solution for lieutenants' satisfaction consists of finding the minimum of the objective function.

The constraints were based on the particular optimized model desired. A separate worksheet was developed for each model, but the data was pulled from the same Access database. In the optimized as-is and optimized incremental

models, the top 10 % of ground-assignable lieutenants were assigned their MOS based on the lineal assignment method and then filtered out of the dataset which was to be optimized. Each Excel worksheet had the specific constraints entered into the solver to ensure accurate calculation and reduce the possibility of error.

There are several ways to implement the actual optimization model. We choose to download and install a fully functional evaluation copy of Premium Solver Platform V5.0 (required to use the XPRESS engine) and XPRESS Solver Engine from www.solver.com. These programs “plug in” to Excel’s existing solver interface and can solve linear programming problems with 200,000 variables and 200,000 constraints. The annotated screenshot shown in Figure 11 provides additional details regarding the implementation of the optimization model within Excel.

Fla	OID	Name	MOS	Choice	Third	Score	> 5 Flag	Top	Mid	Bot	OID	Last Name	MOS	Top3rd	Mid3rd	Bot3rd	Total	Top	Mid	Bot	Total	
0	132688	DOUGHERTY	0204	1	1	0.2597	0	0204	0	0	132688	DOUGHERTY	1	0180	2	3	3	8	2	3	3	8
0	132688	DOUGHERTY	0207	2	1	0.3014	0	0207	0	0	132689	MCAMIS	1	0203	0	2	1	3	0	2	1	3
0	132688	DOUGHERTY	4302	3	1	0.3430	0	4302	0	0	132690	WINGS	1	0204	1	0	0	1	1	0	0	1
0	132688	DOUGHERTY	0402	4	1	0.3847	0	0402	0	0	132691	DOVE	1	0206	0	1	1	2	0	1	1	2
1	132688	DOUGHERTY	0402	5	1	0.4264	0	0402	0	0	132692	EDMISTON	1	0207	1	1	1	3	1	1	1	3
0	132688	DOUGHERTY	0402	6	1	0.4680	0	0402	0	0	132693	RSO	1	0302	5	8	7	20	5	8	7	20
0	132688	DOUGHERTY	0402	7	1	0.5097	0	0402	0	0	132694	JUNETTE	1	0402	7	8	9	24	7	8	9	24
0	132688	DOUGHERTY	5803	8	1	0.5514	0	5803	0	0	132695	RAINS	1	0602	3	3	3	9	3	3	3	9
0	132688	DOUGHERTY	3404	9	1	0.5930	0	3404	0	0	132696	PUGSLEY	1	0802	2	2	1	5	2	2	1	5
0	132688	DOUGHERTY	7208	10	1	0.6347	0	7208	0	0	132697	PELLERIN	1	1302	1	2	3	6	1	2	3	6
0	132688	DOUGHERTY	3002	11	1	0.6764	0	3002	0	0	132698	JOURNEY	1	1802	0	0	1	1	0	0	1	1
0	132688	DOUGHERTY	7204	12	1	0.7180	0	7204	0	0	132699	TALBOTT	1	1803	1	1	1	3	1	1	1	3
0	132688	DOUGHERTY	6602	13	1	0.7597	0	6602	0	0	132700	LEFRANCOIS	1	3002	3	4	3	10	2	4	2	8
0	132688	DOUGHERTY	1302	14	1	0.8014	0	1302	0	0	132701	MAY	1	3404	0	0	1	1	0	0	1	1
0	132688	DOUGHERTY	0206	15	1	0.8430	0	0206	0	0	132702	EYRE	1	4302	0	1	0	1	0	1	0	1
0	132688	DOUGHERTY	0203	16	1	0.8847	0	0203	0	0	132703	BEYER	1	5803	0	0	0	0	0	0	0	0
0	132688	DOUGHERTY	0302	17	1	0.9264	0	0302	0	0	132704	GROTHE	1	6002	1	0	1	2	1	0	1	2
0	132688	DOUGHERTY	0802	18	1	0.9680	0	0802	0	0	132705	LEHMAN	1	6602	0	0	1	1	0	0	1	1
0	132688	DOUGHERTY	1803	19	1	1.0097	0	1803	0	0	132706	ROSS	1	7204	0	1	0	1	0	1	0	1
0	132688	DOUGHERTY	1802	20	1	1.0514	0	1802	0	0	132707	DEWEY	1	7208	0	1	1	2	0	1	1	2
0	132688	DOUGHERTY	0602	21	1	1.0930	0	0602	0	0	132708	JONES	1	7210	1	0	1	2	1	0	1	2
0	132688	DOUGHERTY	6002	22	1	1.1347	0	6002	0	0	132709	RYU	1	7220	0	1	0	1	0	1	0	1
1	132689	MCAMIS	0302	1	1	0.2747	0	0302	0	0	132710	O'NEIL	1	7580	0	0	0	0	0	0	0	0
0	132689	MCAMIS	1802	2	1	0.3164	0	1802	0	0	132711	ESPOSITO	1	7599	0	0	0	0	0	0	0	0
0	132689	MCAMIS	0802	3	1	0.3581	0	0802	0	0	132712	NINI	1	Total	28	39	39	106	27	39	38	104
0	132689	MCAMIS	0302	4	1	0.3997	0	1302	0	0	132713	ABRAMS	1									
0	132689	MCAMIS	1802	5	1	0.4414	0	1803	0	0	132714	CORROW	1									
0	132689	MCAMIS	0204	6	1	0.4831	0	0204	0	0	132715	DETTLE	1									
0	132689	MCAMIS	0206	7	1	0.5247	0	0206	0	0	132716	STANLEY	1									
0	132689	MCAMIS	0602	8	1	0.5664	0	0602	0	0	132717	CALL	1									
0	132689	MCAMIS	0402	9	1	0.6081	0	0402	0	0			1									
0	132689	MCAMIS	7204	10	1	0.6497	0	7204	0	0			1									
0	132689	MCAMIS	4302	11	1	0.6914	0	4302	0	0	132720	MARSHALL	1									
0	132689	MCAMIS	5803	12	1	0.7331	0	5803	0	0	132721	SCHLOEGL	1									
0	132689	MCAMIS	0203	13	1	0.7747	0	0203	0	0	132722	THORNTON	1									

Figure 11 Excel Solver Implementation.

C. OLD MODEL VERSUS NEW MODEL RESULTS

Our analysis will compare and contrast the models on five different companies. We conducted comparisons on five assignment models: lineal assignment, as-is, optimized as-is, optimized incremental and optimized radical. Table 5 provides a breakdown of the constraints within each model.

Top 10% Lock prevents officers in the top 10% of the company from having their MOS traded with another officer. The One-Thirds lock prevents trading MOSs between officers in different thirds. Lineal Ranking Locked puts 100% of the weighting on the lineal number of the officer. Lineal Ranking Weighted puts a proportional weighting on the officer. Choice Number Weighted puts a weighting on the choice number equal to the choice number. Top 5 Choices Equally Weighted places an equal weight on choice numbers 1-5 and on choices 6-23.

	Top 10% Lock	One- thirds Locked	Lineal Ranking Locked	Lineal Ranking Weighted	Choice Number Weighted	Top 5 Choices Equally Weighted
Lineal	x	x	x	x	x	
As-is	x	x		x	x	
Optimized As-is	x	x		x	x	
Optimized Incremental	x			x	x	
Optimized Radical					x	x

Table 5 Comparison of Models.

As mentioned previously, a benefit of using a model is the ability to modify constraints and variables and quickly view the results. For example, users can conduct an analysis of each company in a totally unconstrained environment (no lineal ranking, no thirds, and no lockdown of the top ten percent) where the objective function is to maximize the number of officers who receive their top five choices. Additionally, variables such as lineal ranking can be weighted and then a comparison of the same model with different weights evaluated.

For the purpose of model comparisons, we grouped the MOS choice numbers into four categories: the top five, numbers six through ten, numbers eleven through fifteen and numbers greater than fifteen. Figure 12 displays the average of the five companies into each of the four

categories. It is important to the lieutenants that they receive one of their top five choices, and the linear programming models significantly decreased the number of lieutenants who did not receive a top five choice.

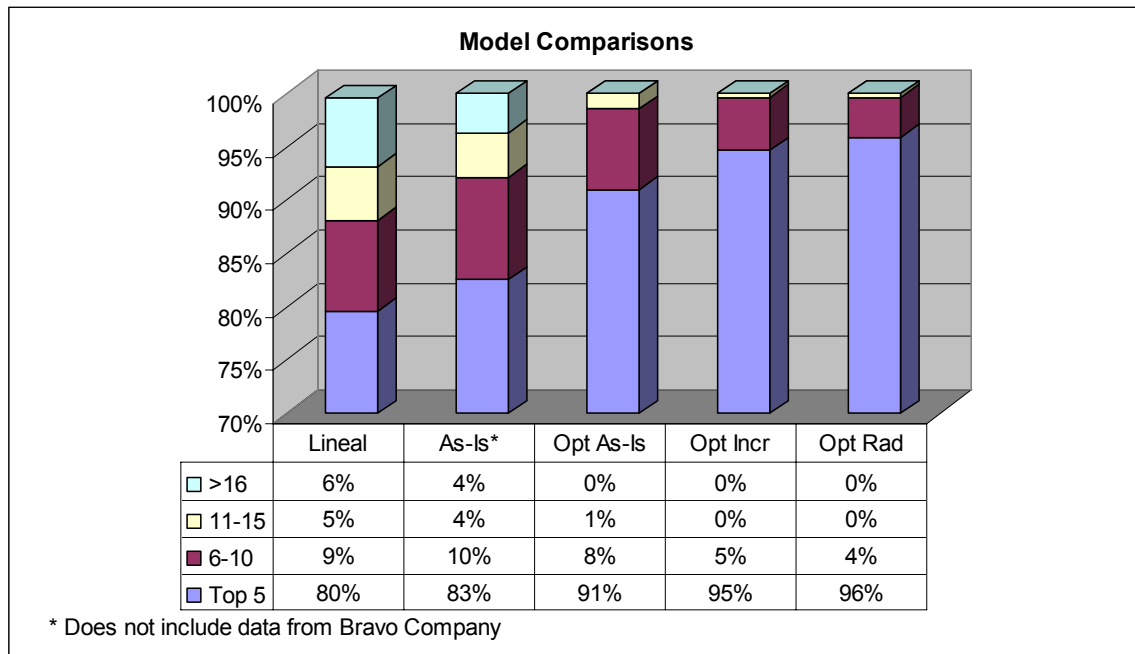


Figure 12 Averages by Model and Choice Category.

This decrease is highlighted in Figure 13. Among the five companies, the average number of lieutenants who did not receive one of their top five choices decreased from 21 to 14 by employing integer linear programming. This decline represents a 33% decrease in the number of non-top five MOS assignments. If the one-thirds constraint is loosened, as with the optimized radical model, the number of non-top five MOS assignments is decreased by 62%.

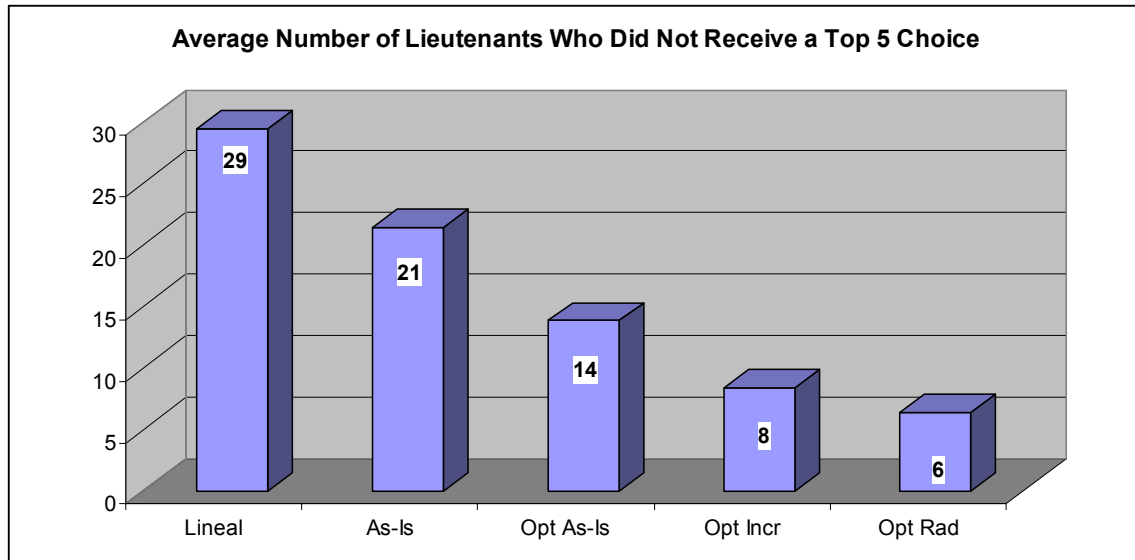


Figure 13 Average Non Top Five Assignments by Model.

The models demonstrate that the loosening of constraints has a direct impact on the ability to assign lieutenants one of their top five choices. The current assignment methodology has remained virtually unchanged for 30 years. Further study should be devoted to a review of the policies and their necessity.

Of course simply improving the choice number assigned to the lieutenant is not in and of itself fully sufficient. The lieutenants indicated their expectation and level of satisfaction was specifically tied to receiving one of their top five choices. Figure 14 displays the average change, by group, each model achieved from the lineal assignment. This is significant because moving lieutenants from the >16 group to the 6-10 group, while representing an improvement, would not have achieved the threshold of satisfaction desired by the lieutenants. The optimized as-is model, as compared to the heuristic as-is

process, achieved a 63% increase in the average number of lieutenants who received one of their top five choices.

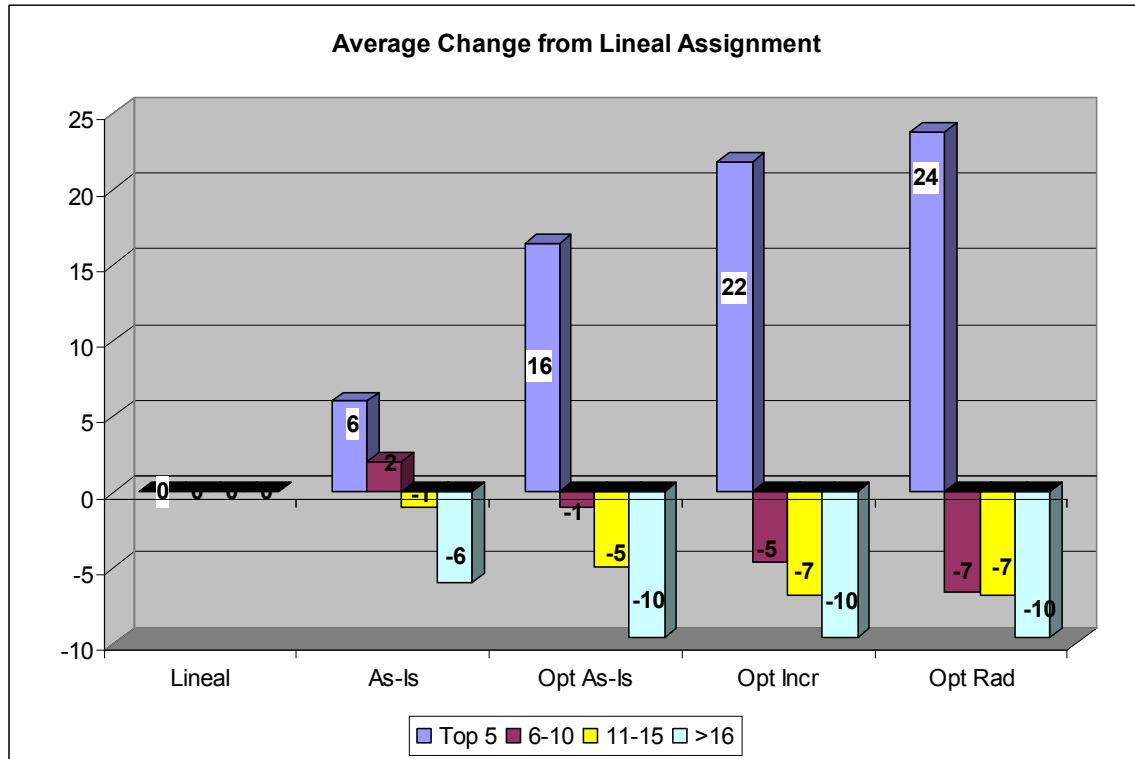


Figure 14 Average Change from Lineal Assignment.

D. TIME SAVINGS

In addition to the numerical improvements realized by linear programming, we achieved substantial cost savings by reducing the manpower involvement in the current assignment process. Table 5 displays a comparison of the current and redesigned MOS assignment process for each company.

	Current Manhours	Improved Manhours	Man-hours Saved with Improved Process
Lineal MOS Assignment	4	.03	3.97
Optimization	32	2	30
Report Generation	6	0	6
Total	42	2.03	39.97

Table 5 Process Comparison.

There are uncaptured cost savings in MOS education, choice submission, information dissemination and process awareness. Perhaps most significant is the intangible improvement of an officer who has higher job satisfaction throughout his or her career.

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V. USER'S MANUAL

A. ORGANIZATION

This chapter is organized into two sections. The first provides for a user's manual for the lieutenants. The second section provides a much more detailed and comprehensive user's manual for the Staff Platoon Commanders and the Company Commanding Officer / Executive Officer.

B. STUDENTS

1. Start Up

Open your Microsoft Internet Explorer browser and enter the following Web address:
<http://ebiz.nps.navy.mil/TBSMOS> (NOTE: This address will change after migration to the TBS server.)

2. MyMOS Home Page

This page, shown in Figure 15, is for display purposes and provides the anonymous user menu. Students may select from the menu to view MOS Information, Login to access additional features or report a problem.



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[Log-in](#)
[Process Info](#)
[MOS Info](#)
[- Career Paths](#)
[- FAQs](#)
[About MyMOS](#)
[MyMOS Designers](#)
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Figure 15 MyMOS Home Page.

3. Login Page

The login page, shown in Figure 16, is the initial access point for the lieutenants to be able to enter MOS Choice information and view reports.

To login enter the username and password provided to you. If you have not yet been provided a username and password, contact your SPC for additional information.



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Please Log-in:

Username:

Password:

Figure 16 Login Page.

If you enter an incorrect password and username, you will be forwarded to the failed login page, shown in Figure

17, where you can select a link to the login page or to email the webmaster for assistance.



Figure 17 Failed Login Page.

4. Successful Login

After successfully logging into MyMOS, you will be taken to the "Welcome to MyMOS" webpage (Figure 18) where you will see general administrative information and have access to your MOS Choices and personal information.

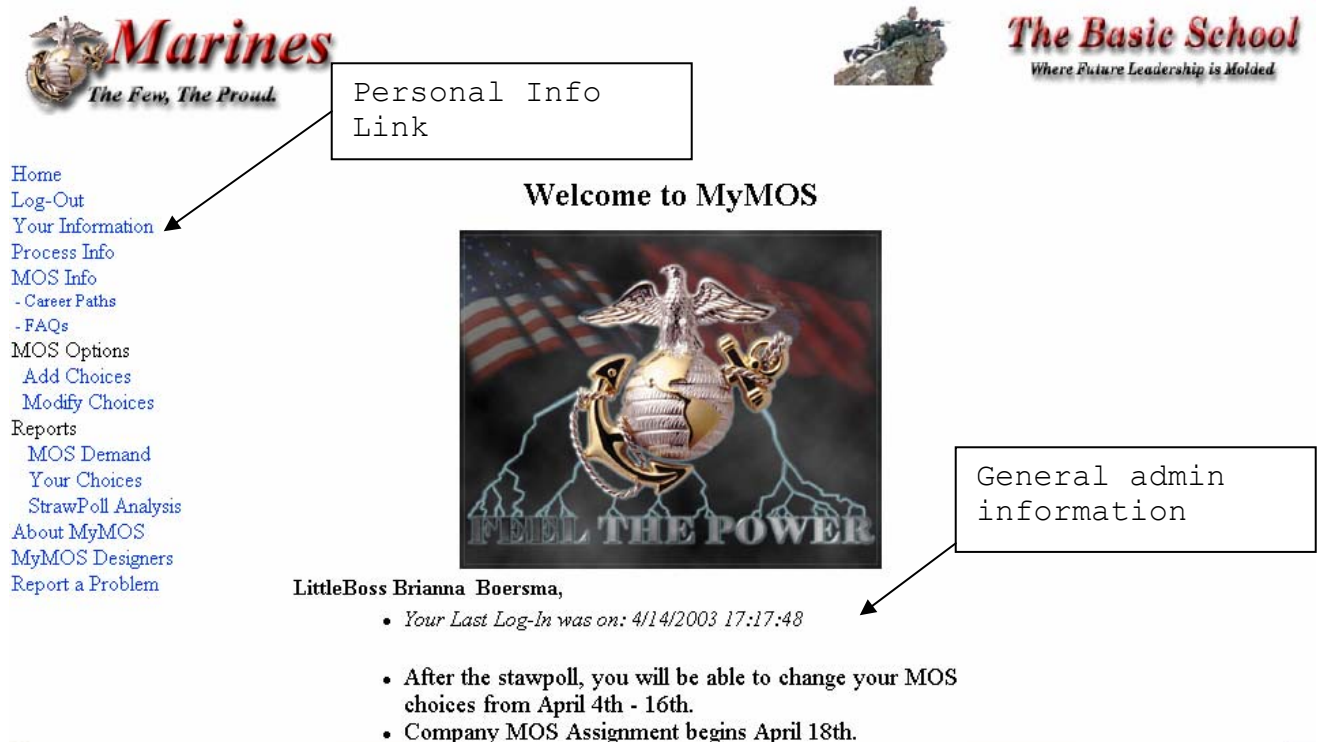




Figure 18 Welcome to MyMOS Webpage.

a. **The Your Information Page** (Figure 19) can be used to change your password and email address.



Marines
The Few, The Proud.



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 Add Choices
 Modify Choices
[Reports](#)
 MOS Demand
 Your Choices
 StrawPoll Analysis
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First Name:	Brianna	Username:	bri
Last Name:	Boersma	Password:	...
Middle Initial	L	Password (again):	...
Last 4:		E-Mail:	test@daboersma.
Gender:	F	Company:	F-02
Contract:	Gnd	Platoon:	
StrawPoll MOS*:	7599	Class Standing:	36
Final MOS:		Company Third:	1

*This MOS was calculated by the MyMOS website. Your company staff will also be conducting a strawpoll based on the 3x5 cards you submitted. Please contact your SPC if you have any questions.

Please contact the [WebMaster](#) if any unchangeable information is incorrect.

Figure 19 Your Information Page

6. The Process Information Page

This page provides an overview of the MOS assignment process. Please read this document for a basic understanding of the steps involved. In many cases, this document will answer your basic questions regarding the process.

7. **The MOS Information Page** (Figure 20) provides a listing of assignable MOSs. This page can be filtered by occupational field via a drop down list. To view the detailed information regarding a specific MOS left mouse click on the applicable MOS/Description.



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Please select a
category of MOSs

Any
Any
Aviation
Combat Arms
Combat Service Support

Submit

MOS/Description	Category
0180, Adjutant	Combat Service Support
0203, Ground Intelligence Officer	Combat Service Support
0204, Human Source Intelligence Officer	Combat Service Support
0206, Signal Intel Ground Elec Warfare Off	Combat Service Support
0207, Air Intelligence Officer	Combat Service Support
0302, Infantry Officer	Combat Arms
0402, Logistics Officer	Combat Service Support
0602, Command and Control Systems Officer	Combat Service Support
0802, Field Artillery Officer	Combat Arms
1302, Combat Engineer Officer	Combat Arms
1802, Tank Officer	Combat Arms
1803, AAV Officer	Combat Arms
3002, Ground Supply Officer	Combat Service Support

Figure 20 MOS Information Page.

8. The Detailed MOS Information Page (Figure 21) provides detailed information and pictures of each MOS. Here you will find a job description of the MOS, the duties normally associated with this occupational skill, the associated Department of Transportation (DOT) classification and the requirements, such as physical or security, related this MOS.



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◀◀ ▶▶ ▶▶

0602, Command and Control Systems Officer

Combat Service Support

Job Description:

Command and control systems officers command, or assist in commanding, a communication unit or element. Supervise and coordinate all aspects of the planning, installation, operation, displacement and maintenance of data, telecommunication, and computer systems.

Requirements:

(1) Complete the Basic Communication Information Systems Officer Course, MCCDC,

Figure 21 Detailed MOS Information Page.

9. The Career Path Page (Figure 22) provides you with a "typical" career path for each occupational field, i.e., combat arms, combat service support, air-ground, fixed wing aviation, and rotary wing aviation. By no means does an officer have to follow this progression to remain competitive, and it is not intended to be used by officers as an assignment tool. This page is intended solely to provide the lieutenants at TBS with a possible timeline of career events so that they may compare occupational fields.



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The following represents a "typical" career path. By no means does an officer have to follow this progression to remain competitive, and it is not intended to be used by officers as an assignment tool. This information is intended solely to provide lieutenants at TBS with a possible timeline of career events so that they may compare occupational fields.

Combat Arms Career Progression

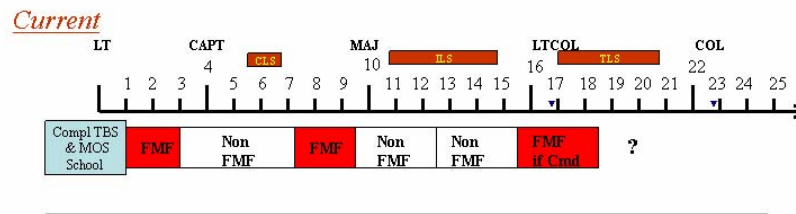


Figure 22 Career Progression Page.

10. The Add Choices Page (Figure 23) allows you to submit your MOS choices. Once a choice and MOS have been submitted, the drop down boxes will remove the submitted number and MOS (see Figure 23 for an example). If you want to modify a choice that has been submitted you must use the Modify Choices page. After selecting a choice number and MOS, select the "Submit" button.



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MOS Info
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Modify Choices
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Please enter your MOS choices with your appropriate weighted desire.

Choice: MOS: Desirability: ☐ High ☐ Low

Desirability: ☐ 1 is a thesis measurement method and will not be used to determine your MOS.

Choice	MOS	Desirability High	Desirability Low
1	7599	<input type="radio"/>	<input type="radio"/>
2	0602	<input type="radio"/>	<input type="radio"/>
8	3404	<input type="radio"/>	<input type="radio"/>
9	4302	<input type="radio"/>	<input type="radio"/>

Note choice numbers 1, 2, 8, and 9 are not available.

Figure 23 Add Choices Page.

11. The Modify Choices Page (Figure 24) allows you to modify or delete one or more of your choices. After modifying your choices, click the "Submit" button. If you attempt to submit the same MOS for more than once choice, you will receive an error message similar to Figure 25. Additionally, you will be returned to the Modify Choices page and your changes will have been discarded.



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Choice	Delete	MOS	Desirability High	Desirability Low
1	<input type="checkbox"/>	7599, Pilot	<input type="radio"/>	<input type="radio"/>
2	<input type="checkbox"/>	0602, Command and Control Systems Officer	<input type="radio"/>	<input type="radio"/>
8	<input type="checkbox"/>	3404, Comptroller	<input type="radio"/>	<input type="radio"/>
9	<input type="checkbox"/>	4302, Public Affairs Officer	<input type="radio"/>	<input type="radio"/>

Select these boxes to delete one or more choice numbers and MOSs.

Figure 24 Modify Choices Page.



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I'm Sorry, but you have selected duplicate MOS's.

Your changes have not been written to the database.

The following MOS's were duplicates:

0602
0602

Identifies the duplicated MOS.

Please wait one moment while your choices are loaded again.

Figure 25 Modify Choices Error Page.

12. Reports. There are three reports available for review.

a. The MOS Demand Report (Figure 26) provides a count of the choice number for each MOS. For example, in Figure 26 you can see that five people have requested the 0203 MOS as their first choice.



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Ground MOS Demand Report* -

Choice Number																								
MOS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0180	2	1	1	1	2	2	5	2	4	8	1	3	9	5	5	5	3	13	15	24	31	2	1	
0203	5	18	6	11	4	11	5	12	16	1	4	6	2	8	7	3	4		3	4	1	2		
0204	10	6	8	12	14	6	12	18	8	7	3	5	3	6	4	2	2		1	1	2			
0206	8	9	9	6	9	9	12	14	17	10	12	5	7	3	4	6	2		2	2	2			
0207	5	8	6	11	6	9	10	9	9	11	17	15	11	4	5	1	5	3		3				
0302	38	10	4	8	7	6	3	7	2	2	4	5	8	3	2	4	3	4	3	3	7	1		
0402	7	5	6	17	5	7	6	11	10	9	11	12	10	6	3	7	3	3	3	5	1			
0602	8	8	6	7	8	6	10	2	6	13	5	8	14	6	7	6	3	7	3	5	4	3	1	
0802	10	18	12	14	13	6	14	5	7	5	4	5	2	3	3	2	4	4		1	1	1		
1302	10	11	19	11	18	17	13	8	7	8	6	2	1	6	3	2	1	1	3		1			
1802	16	16	23	14	8	13	9	4	2	5	2	2	1	3		3	2	3	3	3	1			
1803	6	13	14	14	6	15	10	7	6	4	7	5	3	1	8	2	3	3	3	1		1		
3002		1	1		2	1	4	3	2	5	5	5	5	8	14	9	13	9	15	19	16	9	1	
3404	3	4	2	2	5	5	1	4	3	3	4	5	6	6	8	5	14	16	12	12	16	12		
4302	3	3	4	3	6	1	4	1	8	6	6	12	5	16	7	6	10	9	9	14	9	7		

Figure 26 MOS Demand Report.

You can utilize this report to gain a sense of the demand for individual MOSs.

b. The Your Choices Report (Figure 27) is a list of the MOSs and the choice number you selected for each. This report may be printed off and submitted to the company in lieu of the 3" x 5" cards, or you may utilize it to make notes on each choice.



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Individual Officer MOS Choice Report

Company:

F-02 Platoon:

Boersma Brianna L

Lt or SPC Comments

1	7599	
2	0602	
8	3404	
9	4302	

Figure 27 Your Choices Report.

c. The Straw Poll Analysis Report (Figure 28) provides you direct feedback regarding the MOS assignments during the Straw poll evolution. This report displays your lineal number, what third you were in, the MOS you were assigned, and what choice that MOS was for you. Additionally, this report displays the distribution of the MOSs into each of the thirds (top, middle, and bottom) and the lineal number of the last officer to receive that MOS in each third. This allows you to review each MOS within your third and determine if you had a lineal number high enough to get that particular MOS. For example, using

Figure 28, you can see that your lineal number was 36 and you were in the top third. Using the table on the left you can see that there were two 0206 MOSs assigned in the top third. By utilizing the table on the right of Figure 28 you can see that the two 0206 MOSs available were filled by the 10th lieutenant. Since your lineal number is 36 you would not have been assigned this MOS. However, the 0402 was not filled until the 55th lieutenant, therefore if 0402 had been your first choice you would have received it.

Information	F-02 MOS Distribution:				MOS CloseOut Table*			
	MOS	Top	Middle	Bottom	MOS	Top	Middle	Bottom
ess Info	0180	2	3	2	0180	72	178	221
S Info	0203	3	2	1	0203	44	148	184
eer Paths	0204	1	0	1	0204	17	N/A	179
De	0206	2	1	2	0206	10	125	197
S Options	0207	2	1	2	0207	37	113	202
d Choices	0302	9	9	9	0302	29	135	224
ify Choices	0402	4	3	5	0402	55	144	217
orts	0602	8	7	9	0602	76	168	234
OS Demand	0802	6	5	5	0802	42	157	211
ur Choices	1302	2	2	1	1302	16	147	187
awPoll Analysis	1802	1	1	1	1802	6	84	185
at MyMOS	1803	1	1	1	1803	23	97	190
MOS Designers	3002	3	3	3	3002	83	160	226
ort a Problem	3404	1	1	2	3404	64	127	232
	4302	0	1	0	4302	N/A	150	N/A
	5803	1	1	0	5803	27	90	N/A
	6002	1	0	1	6002	59	N/A	219
	6602	1	1	1	6602	63	106	198
	7204	0	1	0	7204	N/A	154	N/A
	7208	0	1	1	7208	N/A	176	191
	7210	0	1	1	7210	N/A	171	214
	7220	0	1	1	7220	N/A	173	223
	7580	1	2	0	7580	54	134	N/A
	7599	1	2	1	7599	36	155	181

Some StrawPoll Points to Consider:

- Your are currently in the 1st third with a class standing of 36.
- The MOS you received on the strawpoll was 7599 and it was your #1 pick.
- Look at the distribution chart and the number of MOS's in each third.
- Look at the class standing of the Lt that received the last MOS in their respective third.
- Please contact your SPC if you have any questions concerning this data.

*This Table represents the lineal number of the last Lt that was assigned the MOS in each third.

Figure 28 Strawpoll Analysis Report.

13. The Report a Problem Web Page (Figure 29) can be used to notify the web site and database administrators of a problem with the MyMOS website. Please utilize this form to report errors, discrepancies or other problems you are

not able to resolve with the MyMOS website. If applicable, select a radio button that pertains to the problem and then provide additional information in the text box. Click on the "Give us Feedback" button to submit your input.

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MyMOS Web Site Problem Report Form

We are sorry you have experienced a problem with the MyMOS Web Site.

Please select the problem from the list below:

- ☐ Log-In Problems
- ☐ Page Does Not Load Properly
- ☐ Navigation Problems
- ☐ Cannot Find Information You are Looking For
- ☐ Other

Please type more information about the problem you experienced in the box below. (If you are having problems with a specific web page please include the web page address or URL in your comments)

Figure 29 Report a Problem Web Page.

C. COMPANY STAFF

1. Start Up

Open your Microsoft Internet Explorer browser and enter the following Web address:
<http://ebiz.nps.navy.mil/TBSMOS> (NOTE: This address will change after migration to the TBS server.)

2. MyMOS Home Page

This page is for display purposes and provides the anonymous user menu. You may select from the menu to view MOS Information, Login to access additional features or report a problem. See Figure 30.



Figure 30 MyMOS Home Page.

3. Login Page

Select "Log-in" from the menu to access the login page shown in Figure 31. To login enter the username and password provided to you. If you have not yet been provided a username and password, contact the MyMOS administrator.

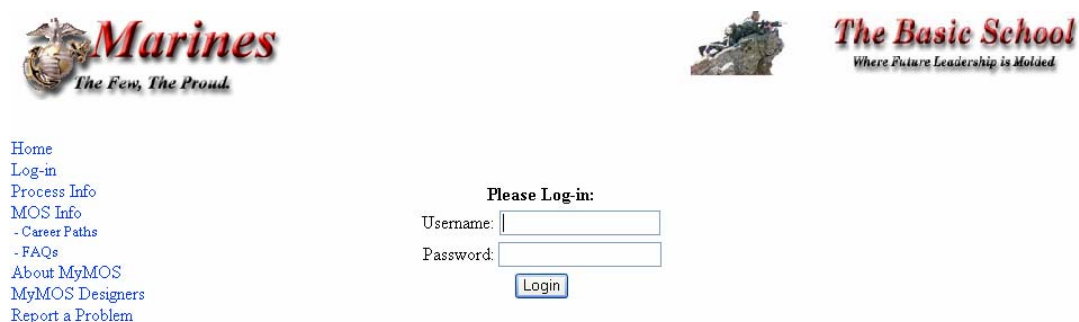


Figure 31 Login Page.

If you enter an incorrect password and username, you will be forwarded to the failed login page (Figure 32) where you can select a link to the login page or to email the webmaster for assistance.

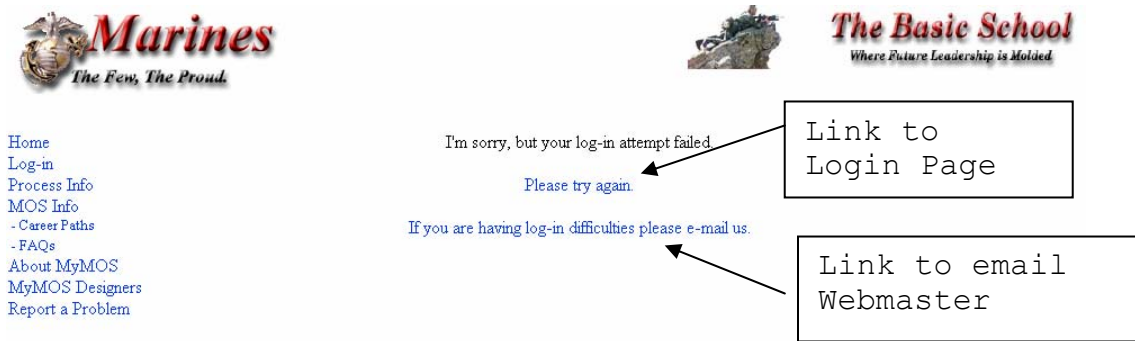


Figure 32 Failed Login Page.

4. Successful Login

After successfully logging into MyMOS, you will be taken to the "Welcome to MyMOS" webpage (Figure 33) where you will see general administrative information and have access to your MOS Choices and personal information.

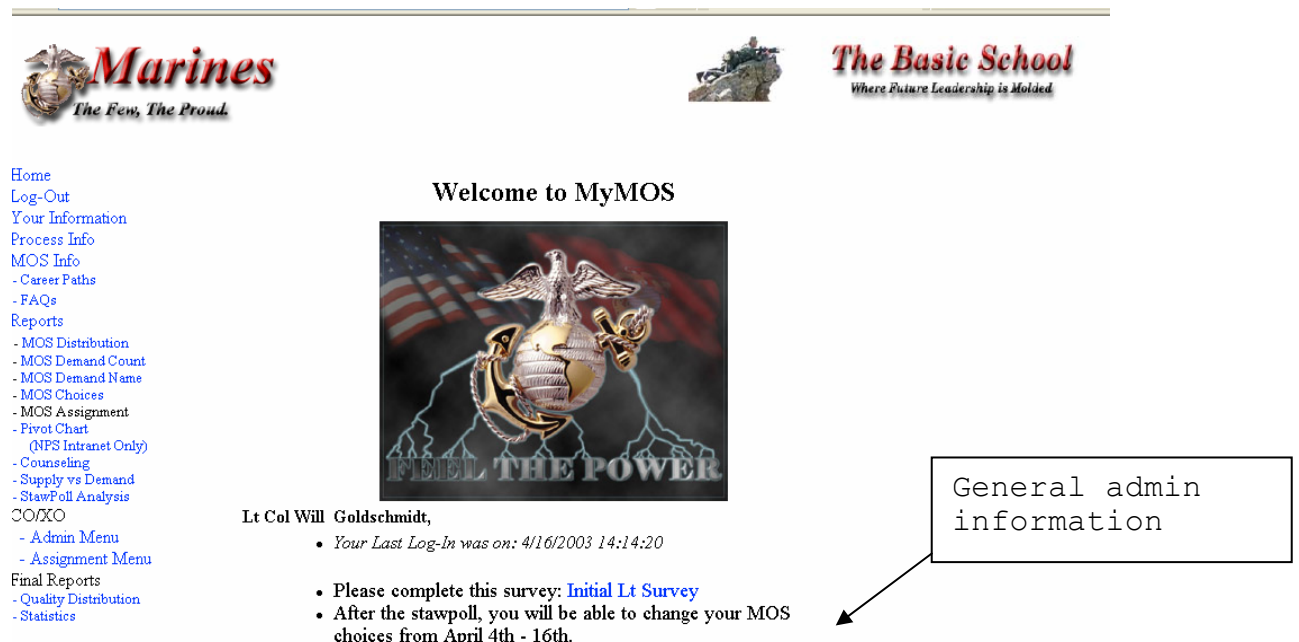


Figure 33 Welcome to MyMOS Webpage.

5. The Your Information Page (Figure 34) can be used to change your password and email address.



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First Name:	Will	Username:	will
Last Name:	Goldschmidt	Password:	••••
Middle Initial		Password (again):	••••
Last 4:	0000	E-Mail:	
Gender:	M	Company:	F-02
Contract:	N/A	Platoon:	0
StrawPoll MOS*:		Class Standing:	0
Final MOS:		Company Third:	

Update Your Record

*This MOS was calculated by the MyMOS website. Your company staff will also be conducting a strawpoll based on the 3x5 cards you submitted. Please contact your SPC if you have any questions.

Please contact the [WebMaster](#) if any unchangeable information is incorrect.

Figure 34 Your Information Page

6. The Process Information Page provides an overview of the MOS assignment process. Please read this document for a basic understanding of the steps involved. In many cases, this document will answer your basic questions regarding the process.

7. The MOS Information Page (Figure 35) provides a listing of assignable MOSs. This page can be filtered by occupational field via a drop down list. To view the detailed information regarding a specific MOS left mouse click on the applicable MOS/Description.



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Please select a category of MOSs

Any
Any
Aviation
Combat Arms
Combat Service Support

Submit

MOS/Description	Category
0180, Adjutant	Combat Service Support
0203, Ground Intelligence Officer	Combat Service Support
0204, Human Source Intelligence Officer	Combat Service Support
0206, Signal Intel Ground Elec Warfare Off	Combat Service Support
0207, Air Intelligence Officer	Combat Service Support
0302, Infantry Officer	Combat Arms
0402, Logistics Officer	Combat Service Support
0602, Command and Control Systems Officer	Combat Service Support
0802, Field Artillery Officer	Combat Arms
1302, Combat Engineer Officer	Combat Arms
1802, Tank Officer	Combat Arms
1803, AAV Officer	Combat Arms
3002, Ground Supply Officer	Combat Service Support

Figure 35 MOS Information Page.

8. The Detailed MOS Information Page (Figure 36) provides detailed information and pictures of each MOS. Here you will find a job description of the MOS, the duties normally associated with this occupational skill, the associated Department of Transportation (DOT) classification and the requirements, such as physical or security, related this MOS.

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►►

0402, Logistics Officer

Combat Service Support

Job Description: Logistics officers plan, coordinate, execute and/or supervise the execution of all logistics functions and the six functional areas of combat service support (CSS) : supply, maintenance, transportation, general engineering, health services, and services . Logistics officers serve as commanders or

Figure 36 Detailed MOS Information Page.

9. **The Career Path Page** (Figure 37) provides you with a "typical" career path for each occupational field, i.e., combat arms, combat service support, air-ground, fixed wing aviation, and rotary wing aviation. By no means does an officer have to follow this progression to remain competitive, and it is not intended for use by officers as an assignment tool. This page is intended solely to provide the lieutenants at TBS with a possible timeline of career events so that they may compare occupational fields.

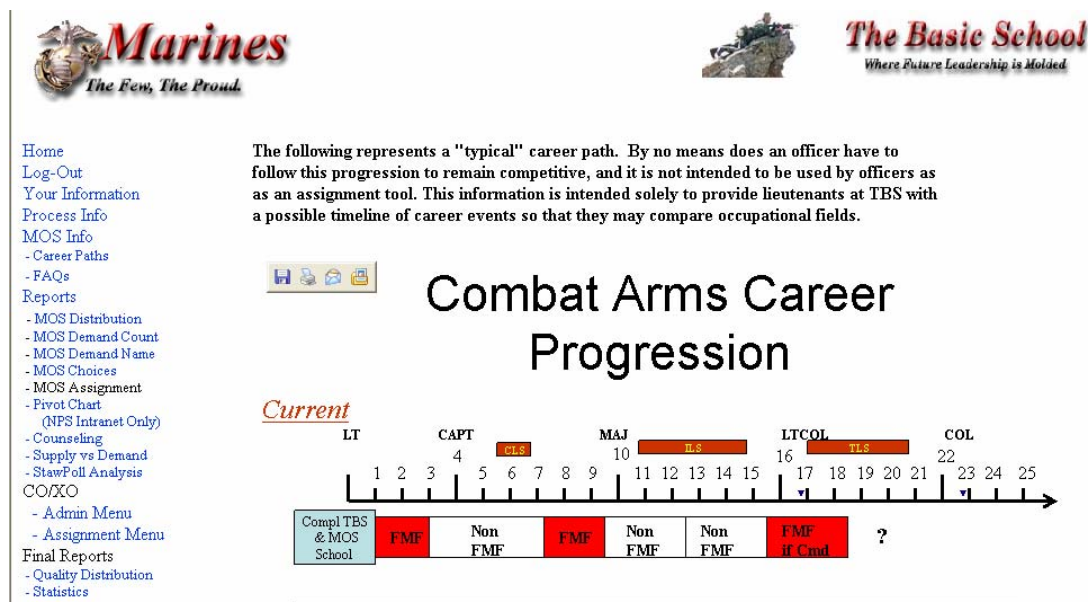


Figure 37 Career Progression Page.

10. Not available on your menu, but available to the lieutenants is the Add Choices page (Figure 38). The Add Choices page allows lieutenants to submit their MOS choices.



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Please enter your MOS choices with your appropriate weighted desire.

Choice: MOS: Desirability: ☐ High ☐ Low

Desirability: ☐ 1 is a thesis measurement method and will not be used to determine your MOS.

Choice	MOS	Desirability High	Desirability Low
1	7599	<input type="radio"/>	<input type="radio"/>
2	0602	<input type="radio"/>	<input type="radio"/>
8	3404	<input type="radio"/>	<input type="radio"/>
9	4302	<input type="radio"/>	<input type="radio"/>

Note choice numbers 1, 2, 8, and 9 are not available.

Figure 38 Add Choices Page.

11. Also not available to staff members, but available to lieutenants is The Modify Choices page (Figure 39). This page allows lieutenants to modify or delete one or more of their choices. If the lieutenants attempt to submit the same MOS for more than once choice they will receive an error message similar to Figure 40. Additionally, they will be returned to the Modify Choices page and all changes they attempted will be discarded.



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Choice	Delete	MOS	Desirability	
			High	Low
1	<input type="checkbox"/>	7599, Pilot	<input type="radio"/>	<input type="radio"/>
2	<input type="checkbox"/>	0602, Command and Control Systems Officer	<input type="radio"/>	<input type="radio"/>
8	<input type="checkbox"/>	3404, Comptroller	<input type="radio"/>	<input type="radio"/>
9	<input type="checkbox"/>	4302, Public Affairs Officer	<input type="radio"/>	<input type="radio"/>

Update Choices

Lieutenants can select these boxes to delete one or more choice numbers and MOSSs.

Figure 39 Modify Choices Page.



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I'm Sorry, but you have selected duplicate MOS's.

Your changes have not been written to the database.

The following MOS's were duplicates:

0602
0602

Identifies the duplicated MOS.

Please wait one moment while your choices are loaded again.

Figure 40 Modify Choices Error Page.

12. Reports. There are eight reports available for review. An overview and example of each report can be seen by selecting the "Reports" menu option.

a. The MOS Distribution Report shows all MOSs, their distribution into thirds and the total number of MOSs assigned to the company and to each third. Figure (Figure 41) is an example of the MOS Distribution report.

MOS	Top	Middle	Bottom	Total
0202	4	4	4	12
0302	16	15	15	46
Total	20	19	19	58

Figure 41 MOS Distribution Report.

b. The MOS Demand Report (Figure 42) provides a count of the choice number for each MOS. For example, in Figure 42 you can see that five people have requested the 0203 MOS as their first choice.

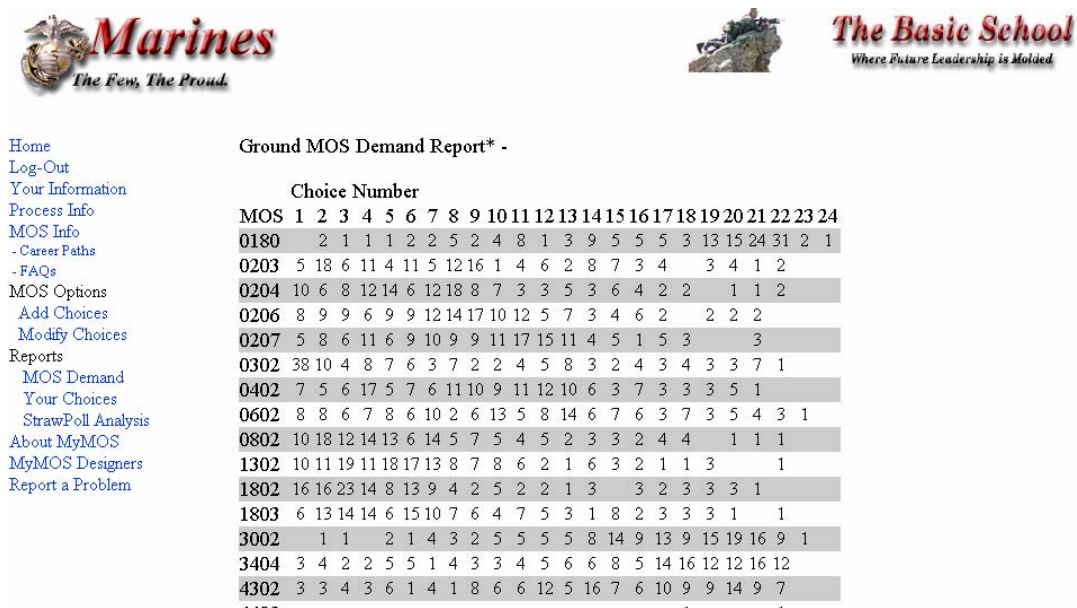




Figure 42 MOS Demand Report.

You can utilize this report to gain a sense of the demand for individual MOSs within the company.

c. The MOS Demand Name report allows you to select an MOS, from the drop-down box, and then view those officers who chose that MOS by the choice number. The

report is sorted in Choice number order. Figure 43 is an example of the MOS Demand Name report.

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Please Select an MOS.

The following officers selected 3404 as a choice

Last Name, First Name, MI	Choice
SMITH, VICENTE, A,	1
ESLICK, MELISSA, J,	1
TAMPANELLO, KAREN, A,	1
KOVACS, DAVID, M,	2
BENNINGHOFF, SCOTT, M,	2
GROVER, STEPHEN, S,	2
WIMSATT, JULIE, F,	2
KIM, DAVID, S,	3
GIBBS, JOSHUA, B,	3
COATES, ZACHARY, A,	4

Figure 43 MOS Demand Name Report.

d. The MOS Choices Report displays lieutenants and all of their choices. The report is sorted alphabetically. This report can be customized by Platoon, Gender, Contract Status and Thirds (once assigned). To customize the report utilize the drop down boxes to select the set of lieutenants you want to view and then click on "Submit." As an additional feature, this report can be copied into a Microsoft Excel spreadsheet. To perform this function click and drag your mouse across the table, highlighting all the information that you desire to copy. Once the data is highlighted, right mouse click and select "copy." Open Excel and select "paste" from the Edit menu. See Figure 44 for an example of this report.



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Select from below to create your custom MOS Choices Report

Plt: Gender: Contract: Third:

The following custom report for _ % _ Platoon _ % _ Gender _ % _ Contract _ % _ Third

Last, First, MI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CAMPBELL, DONOVAN,	0203	0302	0206	1302	0204	1802	1803	5803	0802	0207	0402	0602	4302	7210	7220	0180	7208	3404	5803	6602	6002	7204		
DISEÑO, JONATHAN, S	1302	1802	1803	0402	0802	6002	0602	0302	6602	7204	7208	7220	3404	5803	0204	0203	0206	0207	0302	4302	7580	7599		
KAVE, MATTHEW, B	7599	1802	1803	0302	1302	5803	0203	0204	0206	0802	7208	6602	0207	7220	6002	3404	4302	7580	0204	3002	0402			
FERGUSON, MARK, A	7599	7580	0302	1802	1803	7204	7210	5803	0802	0402	3404	7208	7220	0602	1302	0203	4302		5803	6602	3002	0204	0206	0207
PRATO, MICHAEL, V	0302	1802	1302	0203	0602	1803	0802	0206	7204	0402	5803	0204	0207	7210	6002	7208	4302	0180	0206	6602	3404	3002		
GOBIN, SEAN, D	1802	0302	1803	0204	0203	0206	5803	7204	7210	0802	1302	0207	0602	4302	7208	7220	6002	3404	7204	6602	3002	0180		
BORENE, ANDREW, M	0206	0204	0203	0207	1802	5803	0802	0302	0402	0602	4302	1803	1302	7204	0180	3002	3404	7210	0302	7220	6602	6002		
MERRILL, ROBERT, D	0302	1802	5803	0203	0204	7599	1803	0802	0206	1302	7204	0207	4302	3404	0402	0602	7220	0180	0802	7208	6002	6602	3002	
BIRDZELL, WILLIAM, O	0302	1803	1802	0802	0206	0203	1302	7204	5803	0602	0402	0207	0204	4302	3002	6602	6002	3404	7204	7210	7220	0180		
STOVER, ANDREA, M	0206	4302	0207	1302	5803	0180	7210	3404	7208	7220	6602	0402	6002	3002	0602									
FITZSIMMONS, MATTHEW, J	0302	0203	1302	0802	0204	1802	1803	0402	7220	4302	0207	7210	7204	7208	3404	6002	5803		0402	0206	6602	0180		
MUELLER, MATTHEW, R	0302	0203	1802	0402	1302	0802	1803	0204	0206	0207	5803	4302	0602	0180	3002	6602	7210	7220	0204	3404	7204	6002		

Figure 44 MOS Choices Report.

e. The Pivot Chart Report is only available from inside the firewall. This report was developed using Access' Data Access Page functionality. Data access pages are Internet Explorer 5.0 or greater pages with embedded Dynamic Hyper Text Markup Language (DHTML) and ActiveX controls⁴⁰. This report provides you with a graphical representation of the MOS choices. The data can be filtered by Company, platoon, gender, race, and contract, by utilizing the drop down boxes located at the top of the graphic. MOSs and choice number can be filtered by using the drop down boxes located on the right and bottom left. Additionally the data can be sorted and filtered by right mouse clicking and selecting from the available options. Figure 45 is an example of the Pivot Chart Report.

⁴⁰ R. Smith, Beginning Access 2000 VBA, p. 9.

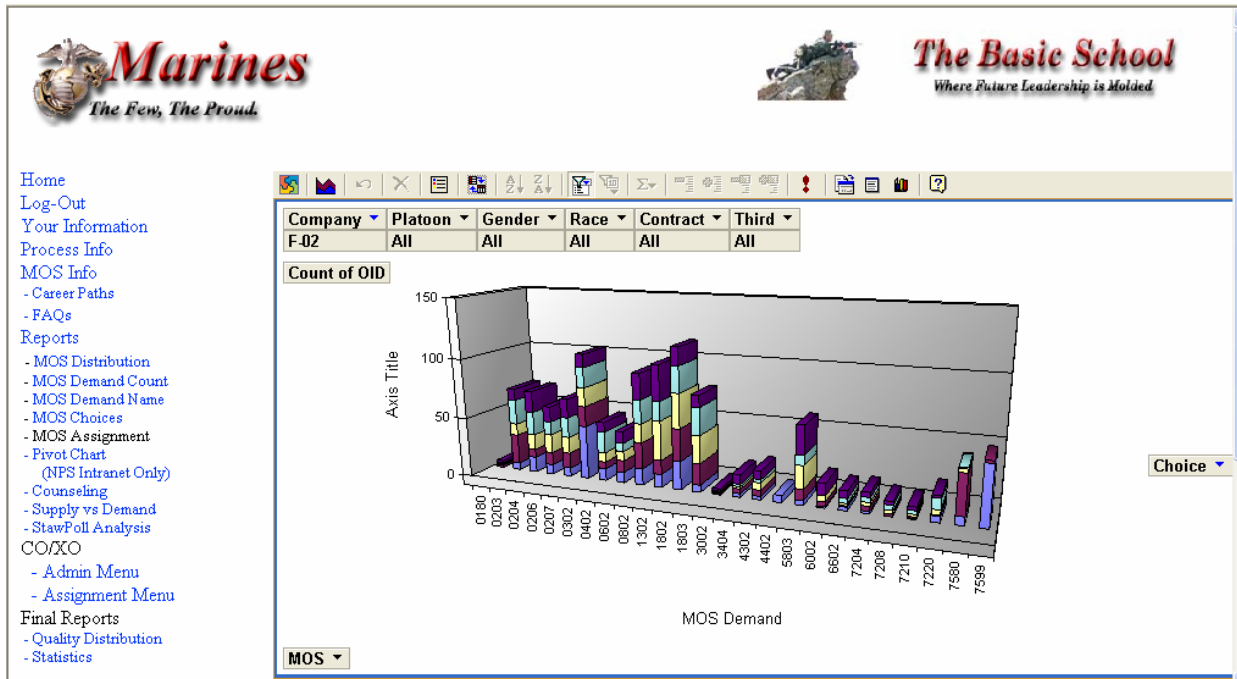


Figure 45 Pivot Chart Report.

e. The Counseling Report is used to submit comments on each of the lieutenant's choices and non-concur with the choice if you feel it is necessary. If you non-concur with the lieutenant's choice the assignment model will not assign this MOS to the lieutenant. You will be presented with a selection page, (see Figure 46) with which you can search for and select individual officers. Upon selecting an officer, the detailed counseling form shown in Figure 47 will be displayed.



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Please type the Last Name of a Lieutenant to Look for.

Submit

Last Name	First Name	MI	Contract	Platoon
AGUILAR, JR.	TOM	E	Gnd	1
ALLEN	JAMES	G	Gnd	1
AMADI	PETE	J	Gnd	2
AMATO	PATRICK	J	NFO	2
ANDERSON	NATHAN			
ARMAS	JASON			
ARNOLD	JOHN			
BAILEY	COLIN			
BARNETT	MICHAEL			
BARTON	RICARDO			
BARTSCH	ADAM	F	Gnd	4
BATTANI	ANTHONY	J	AC	4

Click on Last name to select an officer.

Figure 46 Counseling Selection Page.



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Individual Officer MOS Choice Report

Company: F-02 Platoon: 1

AGUILAR, JR., TOM E.

Choice	MOS	NonRec	SPC Remarks
1	0602	<input type="checkbox"/>	
2	5803	<input type="checkbox"/>	
3	0402	<input type="checkbox"/>	
4	6602	<input type="checkbox"/>	
5	6002	<input type="checkbox"/>	
6	0207	<input type="checkbox"/>	
7	3404	<input type="checkbox"/>	
8	0204	<input type="checkbox"/>	
9	0180	<input type="checkbox"/>	
10	3002	<input type="checkbox"/>	

Figure 47 Detailed Counseling Report.

f. The Supply vs. Demand Report provides the number of MOS's assigned to each third and the number of

officers in that third who requested the MOS as a 1st Choice and as one of their top 5 choices. It then displays the "delta" between assigned and requested. This report is helpful in viewing over demanded and under demanded MOSs.

g. The Straw Poll Analysis Report. Figure 48 provides visibility with regard to the MOS assignments during the Straw poll evolution. This report displays the distribution of the MOSs into each of the thirds (top, middle, and bottom) and the lineal number of the last officer to receive that MOS in each third.

Information ess Info S Info eer Paths Ds S Options d Choices dify Choices rts OS Demand ur Choices awPoll Analysis at MyMOS MOS Designers ort a Problem	F-02 MOS Distribution:				MOS CloseOut Table*			
	MOS	Top	Middle	Bottom	MOS	Top	Middle	Bottom
	0180	2	3	2	0180	72	178	221
	0203	3	2	1	0203	44	148	184
	0204	1	0	1	0204	17	N/A	179
	0206	2	1	2	0206	10	125	197
	0207	2	1	2	0207	37	113	202
	0302	9	9	9	0302	29	135	224
	0402	4	3	5	0402	55	144	217
	0602	8	7	9	0602	76	168	234
	0802	6	5	5	0802	42	157	211
	1302	2	2	1	1302	16	147	187
	1802	1	1	1	1802	6	84	185
	1803	1	1	1	1803	23	97	190
	3002	3	3	3	3002	83	160	226
	3404	1	1	2	3404	64	127	232
	4302	0	1	0	4302	N/A	150	N/A
	5803	1	1	0	5803	27	90	N/A
	6002	1	0	1	6002	59	N/A	219
	6602	1	1	1	6602	63	106	198
	7204	0	1	0	7204	N/A	154	N/A
	7208	0	1	1	7208	N/A	176	191
	7210	0	1	1	7210	N/A	171	214
	7220	0	1	1	7220	N/A	173	223
	7580	1	2	0	7580	54	134	N/A
	7599	1	2	1	7599	36	155	181

Some StrawPoll Points to Consider:

- Your are currently in the 1st third with a class standing of 36.
- The MOS you received on the strawpoll was 7599 and it was your #1 pick.
- Look at the distribution chart and the number of MOS's in each third.
- Look at the class standing of the Lt that received the last MOS in their respective third.
- Please contact your SPC if you have any questions concerning this data.

*This Table represents the lineal number of the last Lt that was assigned the MOS in each third.

Figure 48 Strawpoll Analysis Report.

This allows you to review each MOS within each third and determine if a lieutenant had a lineal number

high enough to get a particular MOS. Imagine that we are a lieutenant with a lineal number of 36 in the top third. Using the table on the left you can observe that there were two 0206 MOSs assigned in the top third. By utilizing the table on the right of Figure 48 you can spot that the two 0206 MOSs available were filled by the 10th lieutenant. Since your lineal number is 36, you would not have been assigned this MOS using the lineal assignment algorithm. However, the 0402 MOS was not filled until the 55th lieutenant; therefore if 0402 had been your first choice you would have received it.

h. The Report a Problem Web Page. Figure 49 can be used to notify the web site and database administrators of a problem with the MyMOS website. Please utilize this form to report errors, discrepancies or other problems you are not able to resolve with the MyMOS website. If applicable, select a radio button that pertains to the problem and then provide additional information in the text box. Click on the "Give us Feedback" button to submit your input.

The screenshot shows a web page titled "MyMOS Web Site Problem Report Form". On the left is a vertical sidebar with the following links: Home, Log-Out, Your Information, Process Info, MOS Info, - Career Paths, - FAQs, MOS Options, Add Choices, Modify Choices, Reports, MOS Demand, Your Choices, StrawPoll Analysis, About MyMOS, MyMOS Designers, and Report a Problem. The main content area has the title "MyMOS Web Site Problem Report Form" followed by the text "We are sorry you have experienced a problem with the MyMOS Web Site." Below this is the instruction "Please select the problem from the list below:" followed by a list of radio buttons: Log-In Problems, Page Does Not Load Properly, Navigation Problems, Cannot Find Information You are Looking For, and Other. Underneath the list is the instruction "Please type more information about the problem you experienced in the box below. (If you are having problems with a specific web page please include the web page address or URL in your comments)" followed by a large text input box. At the bottom center is a button labeled "Give us Feedback".

Figure 49 Report a Problem Web Page.

D. COMMANDING OFFICER / EXECUTIVE OFFICER

The CO and XO have access to four menu items not available to other company staff members. These menu items (see Figure 50) provide the capability to perform administrative functions, execute the assignment algorithms and review the final statistical analysis reports necessary for HQMC.



Figure 50 Administration Page

1. The Admin Menu Page. This page provides access to pages that allow you to add a Marine (see Figure 51), modify a Marines information (see Figure 52 and Figure 53, edit the welcome page instructions (see Figure 54) and lock/unlock the database to control the lieutenants ability to change their choices within the database.

a. The Add a Marine Page allows you to add individual Marines to your company.



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Rank:	2ndLt ▾	Username: **	<input type="text"/>
First Name:	<input type="text"/>	Password:	<input type="text"/>
Last Name:	<input type="text"/>	View Level:	Lieutenant ▾
Middle Initial:	<input type="text"/>	Company:	F-02
Last 4:	<input type="text"/>	Platoon:	Select One ▾
E-Mail:	<input type="text"/>	Class Rank:	<input type="text"/>
Source:	Select One ▾	Gender:	Male ▾
Contract:	Ground ▾	Race:	<input type="text"/>
Pilot Qualified: *	<input type="checkbox"/>	Current MOS:	9901 ▾
NFO Qualified: *	<input type="checkbox"/>		

Add Marine

* These fields only pertain to Ground Contracts
** Username Must be Unique. Standard Convention calls for the first 6 characters of the last name and their 2 initials.

Figure 51 Add a Marine Web Page.

b. The Modify a Marine's Information Page can be used to modify commonly changed information on a lieutenant. You can modify additional information on a lieutenant by clicking on a lieutenant's name. This will take you to the Detailed Modify a Marine's Information page, illustrated in Figure 53. The drop down boxes at the top of the Modify a Marine's Information page can be used to filter Marines by Platoon and contract.



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F-02 Company Marines

Platoon: All Contract: All Filter Filtered Count = 235

Name	Platoon	Gnd Air Qual	Gnd NFO Qual	Contract	Class Standing	Third	E-Mail	Drop
AGUILAR, JR.	1	<input type="checkbox"/>	<input type="checkbox"/>	Ground	137	2	None	<input type="checkbox"/>
ALLEN	1	<input type="checkbox"/>	<input type="checkbox"/>	Ground	202	3	None	<input type="checkbox"/>
AMADI	2	<input type="checkbox"/>	<input type="checkbox"/>	Ground	227	3	None	<input type="checkbox"/>
AMATO	2	<input type="checkbox"/>	<input type="checkbox"/>	Air (NFO)	170	0	None	<input type="checkbox"/>
ANDERSON	5	<input type="checkbox"/>	<input type="checkbox"/>	Ground	218	3	None	<input type="checkbox"/>
ARMAS	3	<input type="checkbox"/>	<input type="checkbox"/>	Ground	168	2	None	<input type="checkbox"/>
ARNOLD	1	<input type="checkbox"/>	<input type="checkbox"/>	Air (Pilot)	159	0	None	<input type="checkbox"/>
BAILEY	3	<input type="checkbox"/>	<input type="checkbox"/>	Air (Pilot)	43	0	None	<input type="checkbox"/>
BARNETT	1	<input type="checkbox"/>	<input type="checkbox"/>	Air (Pilot)	95	0	None	<input type="checkbox"/>
BARTON	5	<input type="checkbox"/>	<input type="checkbox"/>	Air (Pilot)	61	0	None	<input type="checkbox"/>
BARTSCH	4	<input type="checkbox"/>	<input type="checkbox"/>	Ground	143	2	None	<input type="checkbox"/>

Figure 52 Modify a Marine's Information Page.



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Rank:	2ndLt	Username:**	
First Name:	TOM	Password:	
Last Name:	AGUILAR, JF	View Level:	Lieutenant
Middle Initial:	E	Company:	F-02
Last 4:		Platoon:	1
E-Mail:	None	Class Rank:	137
Source:	PLC	Gender:	Male
Contract:	Ground	Race:	C
Pilot Qualified: *	<input type="checkbox"/>	Current MOS:	9901
NFO Qualified: *	<input type="checkbox"/>		

Make Changes

* These fields only pertain to Ground Contracts
** Username Must be Unique. Standard Convention calls for the first 6 characters of the last name and their 2 initials.

Figure 53 Detailed Modify a Marine's Information.



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Date Expires*		Enter New Instruction**
	<input type="text"/>	<input type="text"/>
Remove	Expires	Expired Instructions
<input type="checkbox"/>	3/22/2003	Enter your MOS choices before March 21st.
<input type="checkbox"/>	3/25/2003	You will be able to see the strawpoll results NLT March 24th.
Remove	Expires	Current Instructions
<input type="checkbox"/>	4/17/2003	After the stawpoll, you will be able to change your MOS choices from April 4th - 16th.
<input type="checkbox"/>	4/19/2003	Company MOS Assignment begins April 18th.

Submit Changes

*Default is 7 days from today.
**You may enter html tags in this field to add emphasis to your instructions.

Figure 54 The Edit Welcome Page Instructions
Web Page.

c. The Edit Welcome Page Instructions Page

allows you to submit information and messages that will be displayed on the "Welcome to MyMOS" page. See Figure 55 for an example of this capability. You can use HTML tags to highlight message content. Additionally you can set the expiration date so that old messages are automatically deleted.

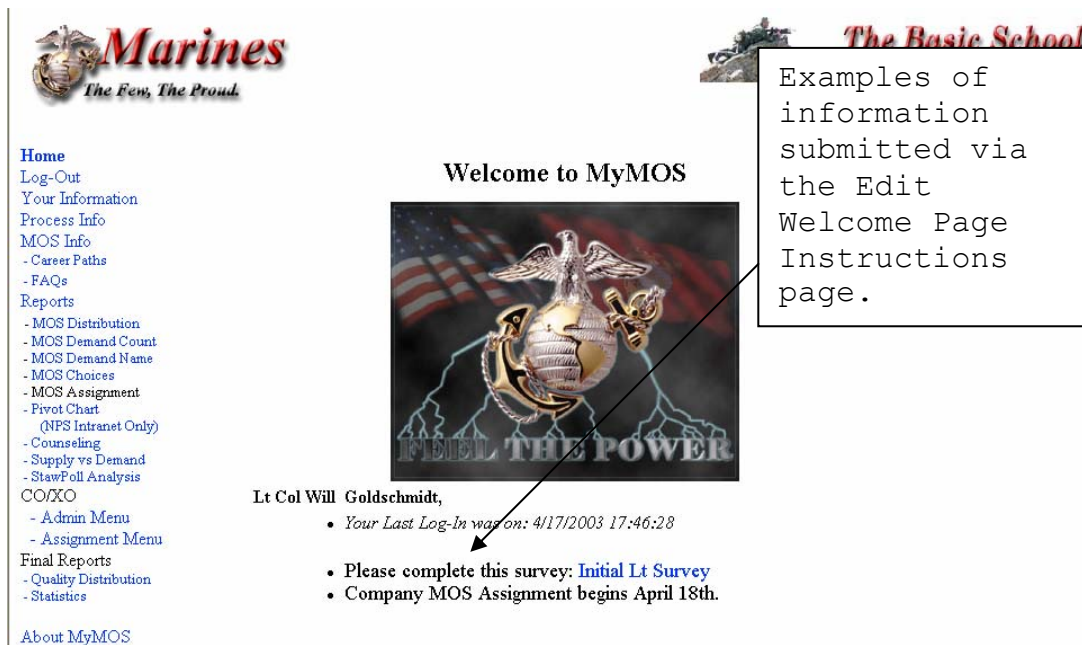


Figure 55 Welcome to MyMOS Web Page.

3. The MOS Assignment Web Page provides you with administrative capability and MOS assignment options. See Figure 56 for a list of options available to you.

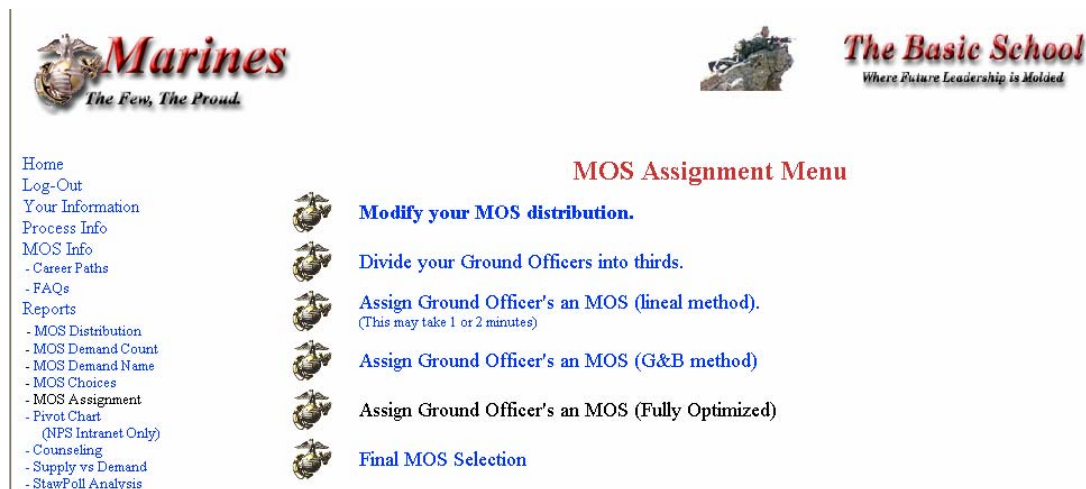




Figure 56 MOS Assignment Menu Page.

a. Use the "Modify your MOS distribution" option to modify your MOS distribution (see Figure 57).



Marines
The Few, The Proud.



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[About MyMOS](#)

	Top Third	Middle Third	Bottom Third	Total
Totals	50	50	50	150

MOS	Top	Middle	Bottom
0180	2	3	2
0203	3	2	1
0204	1	0	1
0206	2	1	2
0207	2	1	2
0302	9	9	9
0402	4	3	5
0602	8	7	9
0802	6	5	5
1302	2	2	1
1802	1	1	1
1803	1	1	1

MOS	Top	Middle	Bottom
3002	3	3	3
3404	1	1	2
4302	0	1	0
5803	1	1	0
6002	1	0	1
6602	1	1	1
7204	0	1	0
7208	0	1	1
7210	0	1	1
7220	0	1	1
7580	1	2	0
7599	1	2	1

Make Changes

Figure 57 MOS Distribution Modification Page.

b. Use the "Divide your Ground Officers into Thirds" option to specify the number of officers in each one-third (see Figure 58). When you click on the Assign 3rds" button each ground officer in your company will be assigned to the top, middle or bottom third. You must do this prior to executing any of the assignment methods.



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• Your current MOS Distribution is:

- Top: 50
- Middle: 50
- Bottom: 50
- Total: 150

• You have **149** Ground assignable Lt's in your company.
Recommended Breakout is: 50 / 50 / 49

Your total must equal the number of Ground assignable Lt's.
Please enter the exact split*

Top:
Middle:
Bottom:

*Usually, this split should match your MOS Distribution. If you have more Lt's than MOS, the bottom Lt's will not get assigned an MOS. Likewise, if you have more MOS's than Lt's - then you will have MOS's that do not get assigned.

Figure 58 Divide Your Ground Officers into
Thirds Webpage.

c. The "Assign Ground Officers an MOS (lineal method) will assign each officer an MOS based on the officers line number and the MOS distribution of each third.

d. The "Assign Ground Officers an MOS (G&B method) will assign each officer an MOS, keeping officers within their third and providing as many officers with as high a choice number as possible. This method does not factor the officer's lineal number into the MOS assignment.

e. The "Assign Ground Officers an MOS (fully Optimized) will assign each officer an MOS by providing as many officers with as high a choice as possible. This method does not keep an officer within his or her third.

f. The "Final MOS Selection" option allows you to specify the MOS to be assigned to an officer (see 0).



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- Report a Problem

Name	Class Standing	Third	Strawpoll MOS	Gender	MOS	Select	Final MOS
TAYLOR, GLEN	1	1	(1) 0302	M	0302	<input type="checkbox"/>	
(1/ 0302) (2/ 0802) (3/ 1302) (4/ 1802) (5/ 5803) (6/ 0203) (7/ 1803) (8/ 0204) (9/ 0206) (10/ 0207) (11/ 7204) (12/ 0402) (13/ 4302) (14/ 0602) (15/ 7210)							
SWABB, ERIK	2	1	(1) 0203	M	0203	<input type="checkbox"/>	
(1/ 0302) (2/ 0203) (3/ 0802) (4/ 1302) (5/ 1802) (6/ 0206) (7/ 0204) (8/ 0207) (9/ 7208) (10/ 7204) (11/ 7210) (12/ 5803) (13/ 0602) (14/ 0402) (15/ 1803)							
CHIU, SHAN	5	1	(1) 0204	M	0204	<input type="checkbox"/>	
(1/ 0204) (2/ 1802) (3/ 1803) (4/ 0203) (5/ 0302) (6/ 0802) (7/ 7204) (8/ 1302) (9/ 0206) (10/ 0207) (11/ 0402) (12/ 0602) (13/ 7210) (14/ 5803) (15/ 7220)							
JAMISON, BINGHAM	6	1	(2) 0203	M	0203	<input type="checkbox"/>	
(1/ 0204) (2/ 0203) (3/ 0302) (4/ 1802) (5/ 1803) (6/ 0206) (7/ 0207) (8/ 0802) (9/ 1302) (10/ 5803) (11/ 7204) (12/ 0602) (13/ 0402) (14/ 4302) (15/ 7210)							
OWEN, JONATHAN	7	1	(1) 0302	M	0302	<input type="checkbox"/>	
(1/ 0302) (2/ 0802) (3/ 1302) (4/ 0204) (5/ 0203) (6/ 1802) (7/ 0206) (8/ 0207) (9/ 5803) (10/ 4302) (11/ 0602) (12/ 1803) (13/ 7220) (14/ 7210) (15/ 7204)							
ALKER, MICHAEL	8	1	(1) 0302	M	0302	<input type="checkbox"/>	
(1/ 1802) (2/ 0302) (3/ 0802) (4/ 1302) (5/ 1803) (6/ 7204) (7/ 0206) (8/ 1103) (9/ 0207) (10/ 7210) (11/ 4302) (12/ 5803) (13/ 0402) (14/ 0602) (15/ 0302)							
BRIDGETT, RICHARD	10	1	(1) 0302	M	0302	<input type="checkbox"/>	
(3/ 3404) (4/ 0206) (5/ 7208) (6/ 0802) (7/ 0207) (8/ 0602) (9/ 6602) (10/ 3002) (11/ 1302) (12/ 4302) (13/ 0180) (14/ 0203) (15/ 0204) (1/ 0302) (2/ 1803)							
FELL, LATHAM	11	1	(1) 0302	M	0302	<input type="checkbox"/>	
(3/ 1802) (4/ 0802) (5/ 1302) (6/ 4302) (7/ 0180) (8/ 0602) (9/ 0203) (10/ 5803) (11/ 0402) (12/ 3404) (13/ 0206) (14/ 0204) (15/ 3002) (1/ 1802) (2/ 7204)							
BARILETTI, ANTHONY	12	1	(1) 1802	M	1802	<input type="checkbox"/>	
(3/ 0204) (4/ 0206) (5/ 0802) (6/ 0203) (7/ 0302) (8/ 0602) (9/ 0207) (10/ 0402) (11/ 1803) (12/ 1302) (14/ 5803) (15/ 6602) (1/ 0302) (2/ 0203) (3/ 0204)							
PALMER, JOSHUA	13	1	(1) 0302	M	0302	<input type="checkbox"/>	
(4/ 0206) (5/ 1802) (7/ 1803) (8/ 0207) (9/ 0802) (10/ 1302) (11/ 5803) (12/ 7204) (13/ 7210) (14/ 4302) (1/ 0302) (2/ 0206) (3/ 0204) (4/ 0203) (5/ 0802)							
MAYER, TIM	14	1	(1) 0302	M	0302	<input type="checkbox"/>	

Figure 59 Final MOS Selection page.

3. The final two options available to the CO/XO are the Quality Distribution report and the Statistics report.

a. The Quality Distribution Report (Figure 60) provides a statistical analysis of the MOS Distribution for various elements, such as MOS category and MOS.

MOS Category		Top 1/3	Middle 1/3	Bottom 1/3	Total
Aviation	(6002, 6602, 7204, 7208, 7210, 7220, 7580, 7599)	4	9	6	19
Combat Arms	(0203, 0302, 0802, 1802, 1803)	19	18	17	54
Combat Service Support	(0180, 0204, 0206, 0207, 0402, 0602, 1302, 3002, 3404, 4302, 5803)	27	23	27	77
Total		50	50	50	150

2. Assignment of Ground-Assignable Female Officers

MOS		Top 1/3	Middle 1/3	Bottom 1/3	Total
0180	Adjutant	2	0	1	3
0206	Signal Intelligence Ground Electronic Warfare Off	1	0	0	1
0207	Air Intelligence Officer	0	1	0	1
0402	Logistics Officer	2	0	1	3
0602	Command and Control Systems Officer	0	0	1	1
1302	Combat Engineer Officer	0	1	0	1
3002	Ground Supply Officer	0	1	0	1
4402	Judge Advocate	0	0	0	1
5803	Military Police Officer	0	1	0	1

Figure 60 Quality Distribution Report.

b. The Statistics Report provides a detailed statistical analysis of the Company. See Figure 61 for an example of the Statistics Report.

1. Composition of F-02 Company.

Overall Composition	#	Minority & Female Officers	#	Aviation Candidates	#
USMC Male Officers	224	Total Male Minority Officers	36	7599 Qualified Applicants	4
USMC Female Officers	19	Male Minority Ground-Assignable	20	7599 Guarantees	72
International Officers	0	Total Female Officers	19	7580 Qualified Applicants	3
		Female Ground-Assignable	15	7580 Guarantees	3
Total Strength	243			Total Air Guarantees and Qualified	82

2. Combat Arms Spread (Ground-Assignable Males only)

	Top 1/3	Middle 1/3	Bottom 1/3	Total
# of Males	45	44	47	136
# of Combat Arms MOSs	19	18	17	54
Total Percentage	42%	41%	36%	40%

3. Combat Service Support Spread (Ground-Assignable Females only)

	Top 1/3	Middle 1/3	Bottom 1/3	Total
# of Females	6	7	3	16
# of CSS/C4I MOSs	27	23	27	77
Total Percentage	22%	30%	11%	21%

4. Commissioning Information

Non-Ground-Assignable Officers	#	Commissioning Sources	#
Aviator contracts (7599)	72	ECP/ MCP/ MECEP	15
NFO contracts (7580)	3	NROTC/ OCC	32
Law contracts (4401)	12	PLC	180
Other: DCP contract-No MOS assigned	0	DCP / Inter-Service Transfers	5
Total Non-Ground-Assignable	87	USNA	3
Total Ground-Assignable	149	Int'l Officers	0
		Total	243

5. Ground-Assignable "Choice" Distribution Table

	1st	2nd	3rd	4th	5th	6th-10th	11th-15th	16th-20th	21st or >	Total
Quantity	153	25	10	7	5					243
Overall %	63%	10%	4%	3%	2%					100%

Figure 61 Statistics Report.

VI. RECOMMENDATIONS AND CONCLUSIONS

A. RECOMMENDATIONS

1. Support Additional Research on Optimization Techniques, Including the Following:

a. Improved Thirds Distribution

This will investigate an optimization for distribution of MOSs into thirds. Specifically, it will evaluate a methodology to determine the optimum distribution of the MOSs based on the lieutenants' choices. This methodology would allow for MOSs not divisible by three to be distributed in a manner that would optimize the number of lieutenants that received a top five MOS choice. For example, under the current process for MOS distribution is there are two vacancies for an MOS the company commander decides which one-third they should be distributed to. Utilizing optimization, the distribution of MOSs can account for the demand within the third, and determine to which thirds the two vacancies should be assigned.

b. Elimination of Thirds Distribution

The distribution of the unrestricted ground assignable officers into one-thirds is an attempt to ensure a quality spread of officers among the different MOSs. Created 30 years ago, this business rule remains essentially unchanged today.⁴¹ Although we cannot confirm it, the authors believe that the previous assignment method was lineally within each company. Whether trades were allowable is unknown. This method would surely have distributed all of the undesirable MOSs to the bottom half of the company. This is most likely what lead to the one-

thirds business rule. The use of optimization techniques removes this bias and more equally distributes the MOSs within the company. While not perfectly distributed for any one company, the long-term distribution may well be very close to an equal distribution. The authors believe that this area deserves additional study.

c. Improved MOS Distribution

The Manpower Plans division of Manpower and Reserve Affairs, Headquarters, U.S. Marine Corps, utilizes an optimization program to distribute the MOSs to each company. The objective of this program is to minimize the number of days awaiting training between graduation from TBS and the start of a lieutenant's MOS school. The MyMOS program will capture the MOS demand for lieutenants over a historical period. Mining the historical data for demand significance could positively affect the MOS distribution. This would create a balance between days awaiting training and demand.

d. Billet Assignment

Another area of research is to develop a billet assignment system for Marine officers similar to MyMOS. Manpower Management Officer Assignments (MMOA) already utilizes a web interface for the submission of billet preferences.⁴² This rudimentary system allows officers to submit three geographical and duty preferences. This information is visible to the monitor who issues the assignment. Unfortunately, the monitors are heuristically attempting to match several hundred billets to officers who

⁴¹ Conversation with LtGen Hanlon, April 2003.

⁴² <https://mol.usmc.mil/System/TFAS/Login.asp>, April 2003, MOL website.

have submitted three or more choices. This is a time-consuming and frustrating task for the monitors. We recommend a reexamination of the data structure and web interface with a view toward an optimization program, which provides a "starting point" for the monitors.

2. Establish Partnering Relationships

The Naval Postgraduate School contains a wealth of intellectual capital. Small organizations, such as TBS, can reap tremendous benefits by partnering with NPS. The Information Systems Technology curriculum provides an interdisciplinary problem-solving education that is ideally suited to assist TBS or other organizations similar to it. MyMOS provides a solution to one small element of the total information management puzzle. However, TBS could benefit from integrated information solutions, particularly in areas such as personnel management and resource scheduling.

3. Mathematical Model Analysis

There is a plethora of mathematical models capable of supporting the MOS assignment process. This thesis did not attempt to identify the best; rather it objectively evaluated the capability to improve the process utilizing linear programming techniques. Clearly, a more thorough analysis should be conducted of the different models and their ability to support the business rules of TBS.

4. Incorporate Optimization into the Process

It is highly recommended that TBS purchase the Premium Solver software or similar software.⁴³ This thesis clearly demonstrated the improvements possible by incorporating

⁴³ Website, <http://www.solver.com/exceluse.htm>, May 2003

such COTS optimization software. For a total investment of less than \$10,000, TBS can improve the MOS assignments of hundreds of lieutenants.

The authors used an Excel plug-in for their research. In order to avoid the use of an additional application, TBS could employ a dynamic link library (DLL) to serve the same purpose. An NPS computer science or information technology student could integrate the DLL between Access and the IIS server, providing a seamless optimization solution on the web.

B. CONCLUSIONS

The development of MyMOS clearly demonstrates the value of information technology and interdisciplinary problem solving. Our goal from the outset was to develop a fully functioning, operationally deployable solution to assist TBS in the MOS assignment process. While the thesis achieved that objective, the lessons learned during that journey were in many respects as valuable as ,or more valuable than, the solution itself.

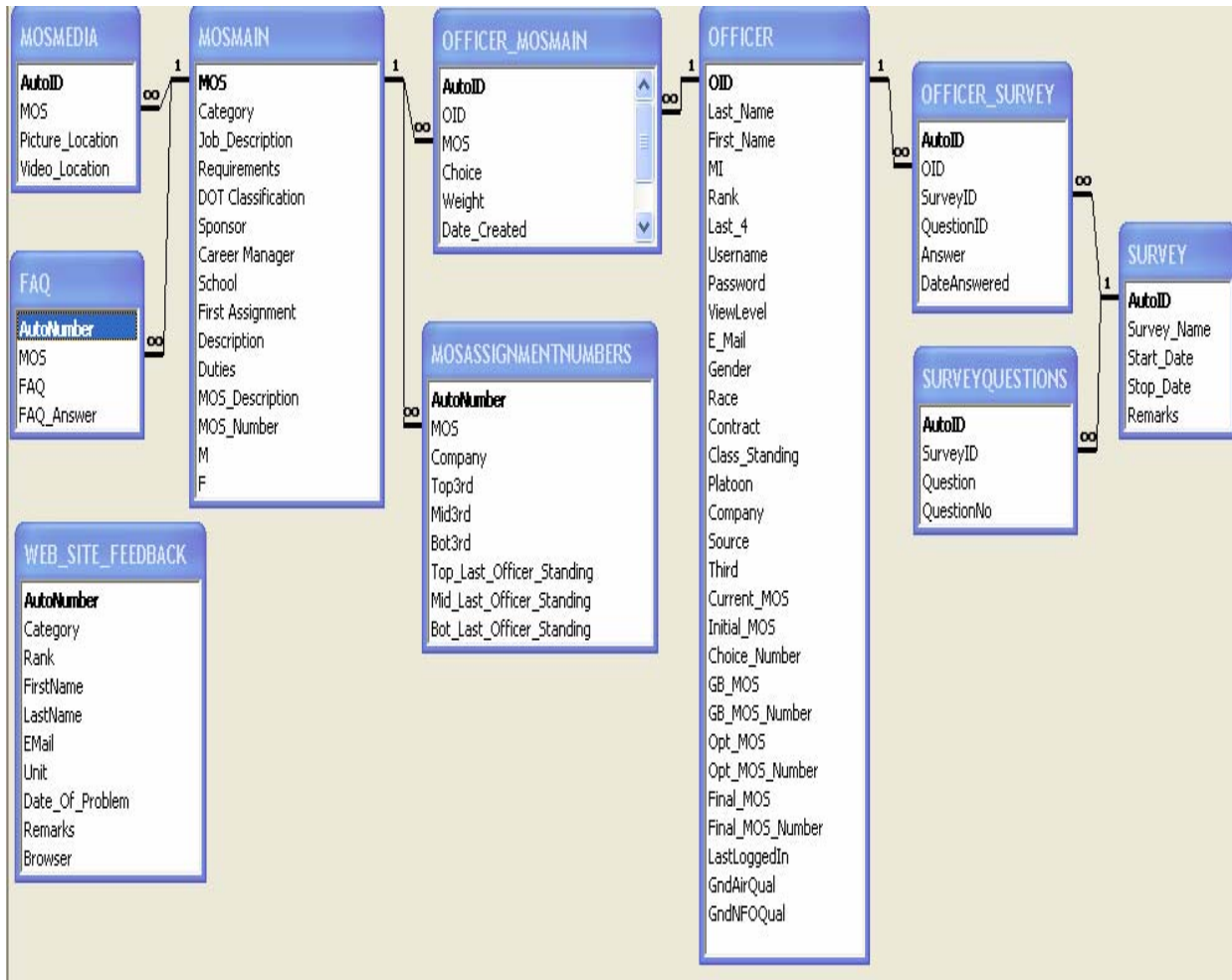
The decision by TBS to accept the system in its entirety remains undecided at the point of this writing. The authors believe the system represents a significant advancement over the current method. However, we recognize the struggle inherent in deploying new systems, which incorporate unknown or misunderstood processes. The field of operations research has been in existence since the 1940s; but even today, few know or understand its purpose and place. We want to emphasize the fact that we are not attempting to replace the decision maker but rather enhance

their operational awareness and provide them with a best practices "starting point."

MyMOS demonstrated the capability to rapidly develop and deploy an improved decision support system by partnering with NPS resources.

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APPENDIX A: ER DIAGRAM



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APPENDIX B: SPECIALIZED CODE

A. MENU.DWT.ASP

The following is the code for the template used by all the web pages.

```
<%@LANGUAGE="VBSCRIPT" CODEPAGE="1252"%>
<html>
<head>
<!-- TemplateBeginEditable name="doctitle" -->
<title>MyMOS TBS Web Site</title>
<!-- TemplateEndEditable -->
<meta http-equiv="Content-Type" content="text/html;
charset=iso-8859-1">
<!-- TemplateBeginEditable name="head" --> <!--
TemplateEndEditable -->
<link href="../css/menucss.css" rel="stylesheet"
type="text/css">
<!-- TemplateParam name="onLoad" type="text" value="" -->
<!-- TemplateParam name="OnLoad" type="text" value="" -->
</head>
<body onLoad="@@(onLoad)@@">
<table width="100%" border="0" onload="@@(OnLoad)@@">
  <tr valign="top">
    <td height="50"><div align="left"><a
href="www.hqmc.usmc.mil"></a></div></td>
    <td></td>
    <td><div align="right"><a href="www.tbs.usmc.mil"></a></div></td>
  </tr>
  <tr valign="top">
    <td height="28"></td>
    <td>&nbsp;</td>
    <td><div align="right"></div></td>
  </tr>
</table>
```

```

<table width="104%" border="0" cellpadding="0" cellspacing="0"
<tr>
  <td width="20%" height="662" valign="top" class="roll">
<p>
  <%
If Session("MM_Username") = "" then
%>
    <a href="../default.asp">Home<br>
    </a> <a href="../TBS_Login.asp">Log-in</a><br>
    <a href="../All_MOS_Assignment_Process.asp">Process
Info</a><br>
    <a href="../All_MOS.asp">MOS Info</a> <a
href="../All_Career_Progression.asp"><br>
    <font size="2">&nbsp;- Career Paths</font></a><br>
    <font size="2"><a href="../All_MOS_FAQ.asp">&nbsp;-
FAQs</a></font> <br>
    <%
else
%>
    <a href="../All_Welcome.asp">Home</a><br>
    <a href="../All_Logout.asp">Log-Out</a><br>
    <a href="../TBS_Profileupdate.asp">Your
Information</a> <br>
    <a href="../All_MOS_Assignment_Process.asp">Process
Info</a> <br>
    <a href="../All_MOS.asp">MOS Info</a><br>
    <a href="../All_Career_Progression.asp"><font
size="2">&nbsp;- Career
Paths</font></a><br>
    <font size="2"><a href="../All_MOS_FAQ.asp">&nbsp;-
FAQs</a></font> <br>
    <%
end if
If Session("MM_Username") <> "" and Session("Level") =
"Student" then
%>
    MOS Options<br>
    <a href="../Lt_MOS_Add.asp">&nbsp;&nbsp;&nbsp;Add
Choices</a><br>
    <a href="../Lt_MOS_Modify.asp">&nbsp;&nbsp;&nbsp;Modify
Choices</a><br>
    Reports<br>
    <a href="../TBS_MOS_Demand.asp">&nbsp;&nbsp;&nbsp;MOS
Demand</a><br>

```



```

        &nbsp; <span class="roll"><font color="#0033FF">-
<a href="../../../XO_Assignment_Menu.asp">Assignment
Menu</a></font></span><font size="2"><span
class="roll"><font color="#0033FF"><a
href="../../../XO_Assignment_Menu.asp"><br>
</a></font></span></font> Final Reports<br>
<span class="floatingmenu"><font color="#0033FF"
face="Times New Roman, Times, serif"><font size="2">
&nbsp;<a href="../../../Staff_Quality_Distribution.asp">-
Quality Distribution</a><br>
&nbsp;<a href="../../../Staff_rptStats.asp">-
Statistics</a><br>
</font></font></span> <br>
<%
end if
%>
        <a href="../../../All_AboutMyMOS.asp">About MyMOS</a><br>
        <a href="../../../Member/Project_Members.asp">MyMOS
Designers</a><br>
        <a href="../../../All_Feedback.asp">Report a Problem</a>
</td>
        <td width="80%" valign="top">
<!-- TemplateBeginEditable name="SessionSecurity" -->
        <% If Session("Level") <> "High" then %>
<!-- TemplateEndEditable -->
<div align="center">
        <p><font size="+2">I'm Sorry, but it appears you do
not have proper permissions
        to view this page.</font></p>
        <p><font size="+2">You may have to <a
href="TBS_Login.asp">log-in</a>
        again because of inactivity.</font></p>
        <p><font size="+2">Please contact the <a
href="mailto:djboersm@nps.navy.mil">webmaster</a>
        if you have any questions.</font></p>
</div>
<% else %>
<!-- TemplateBeginEditable name="body" --> <!--
TemplateEndEditable --></td>
<% end if %>
        </tr>
</table>
<table width="100%" border="0">
        <tr>
                <td><em><font size="-1">Last Updated: 3 April
2003</font></em></td>

```

```

        <td><font size="-1">Please contact the <a
href="mailto:djboersm@nps.navy.mil">Webmaster</a>
        if you encounter any problems.</font></td>
        <td>&nbsp;</td>
        <td>&nbsp;</td>
        <td><a
href="https://www.tbs.usmc.mil/Pages/Security_notice/securi
ty_notice.htm"><font size="-1">Accessibility
        and Privacy</font></a></td>
    </tr>
</table>
</body>
</html>

```

B. ALL_WELCOME.ASP

The following code supports the assignment of session variables when the user logs in.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open
'=====Manual
Code=====
%>
.
.
.
<%
'=====Manual
Code=====
'Assign Session Variables
Session("Gender")=( "MOSMAIN." )&(rsWelcome.Fields.Item("Gend
er").Value)
Session("GenderTable")=( "lkMOSNumber" )&(rsWelcome.Fields.It
em("Gender").Value)
Session("Level")=(rsWelcome.Fields.Item("ViewLevel").Value)
Session("Company")=(rsWelcome.Fields.Item("Company").Value)

```

```

'=====Manual
Code=====
%>
.
.
.
<%
'=====Manual
Code=====
'Generating and executing an update SQL statement to
generate a current log-in time.
LoginTime = Now()
strSQL = "UPDATE OFFICER SET LastLoggedIn = #"&LoginTime&"#
WHERE Username = '" &
(rsWelcome.Fields.Item("Username").Value) & "'"

CommandUD.Execute strSQL
CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

C. LT_MOS_MODIFY_CODE.ASP

The following code allows the CO/XO to modify all user information.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Getting information from the form
Dim iCount
iCount = Request.Form("Count")

'Declare the variables for MOS and ID
Dim strMOS, strID, strweight
Dim strSQL

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

```



```

'Check for duplicate MOS submissions
Dim iLoopMOS1, iLoopMOS2
Dim strcheckMOS1, strcheckMOS2
Dim duplicateFlag, duplicateMOScount
duplicateFlag = 1

For iLoopMOS1 = 0 to iCount
strcheckMOS1 = Request(iLoopMOS1 & ".MOS")
For iLoopMOS2 = 0 to iCount
strcheckMOS2 = Request(iLoopMOS2 & ".MOS")

if iLoopMOS1 <> iLoopMOS2 then
    if strcheckMOS1 = strcheckMOS2 then
        if duplicateFlag = 1 then
%> <p align="center"><strong>I'm Sorry, but
        you have selected duplicate MOS's.
</strong></p>
        <p align="center"><strong>Your changes have not
been written to the
        database.</strong></p>
        <p align="left"><strong>The following MOS's
were duplicates:</p>
        <p>
        <%
        Response.Write strcheckMOS1
        duplicateFlag = 2
%>
        <br>
        <%
        else
%>
        <strong>
        <%
        Response.Write strcheckMOS1
%>
        </strong> </p>
        <p><strong><font size="+1">Please wait one
moment while your choices
        are loaded again.</font></strong> <br>
        <%
        end if
    end if
end if
Next
Next

```

```

if duplicateFlag = 1 then

'Create a Loop through the iCount to receive values from
MOSmodify.asp
Dim iLoop
For iLoop = 0 to iCount
strCheck = Request(iLoop & ".Check")
strMOS = Request(iLoop & ".MOS")
strID = Request(iLoop & ".ID")
strweight = Request(iLoop & ".weight")

'Generating and executing a delete or update SQL statement.
if strCheck = "Remove" then
    strSQL = "DELETE FROM OFFICER_MOSMAIN WHERE AutoID = "
    & strID
else
    strSQL = "UPDATE OFFICER_MOSMAIN SET MOS = '" & strMOS
    & "' , Weight = '" & strweight & "'" & " WHERE AutoID = " &
    strID
end if

CommandUD.Execute strSQL
Next

CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

D. LT_SURVEY1CODE.ASP

The following code writes survey response data to the appropriate Access table.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

```

```

'Getting information from the form
OID = Request.Form("OID")
SurveyID = 1

For iLoop = 1 to 27
Answer = Request.Form("Q" & iLoop)

'Generating and executing an insert SQL statement
strSQL = "INSERT INTO OFFICER_SURVEY ( OID, SurveyID,
QuestionID, Answer ) Values ('" & OID & "', '" & SurveyID &
"', '" & iLoop & "', '" & Answer & "'"
"

CommandUD.Execute strSQL
Next

CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

E. STAFF_COUNSELING_DETAIL_CODE.ASP

The following code allows SPCs to submit comments on MOS choices and non-concur with a lieutenants MOS choice.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open
'=====Manual
Code=====
%>
.
.
.
<%
'=====Manual
Code=====
'Getting Information from previous page

```

```

Dim iCount
iCount = Request.Form("Count")

For iLoop = 0 to iCount
    strID = Request(iLoop & ".ID")
    strNonRec = Request(iLoop & ".NonRec")
    strRemarks = Request(iLoop & ".Remarks")
    If strNonRec <> "True" then
        strNonRec = "False"
    End if

    'Generating and executing an update SQL statement
    strSQL = "UPDATE OFFICER_MOSMAIN SET SPC_Comment = '"
    & strRemarks & "', SPC_Disagree = " & strNonRec & " WHERE
    AutoID = " & strID
    CommandUD.Execute strSQL

Next

CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

F. XO_ASSIGN_OFFICERS_THIRDS.ASP

The following code assigns all ground officers to the appropriate one-third.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Declare variables needed to execute the SQL statement
Dim strSQL, strOID

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

' Getting total number of Ground Officers
GndOfficerCount = 0

```

```

'Resetting Recordset
rsGndOfficers.MoveFirst
While (NOT rsGndOfficers.EOF)
GndOfficerCount = GndOfficerCount + 1
rsGndOfficers.MoveNext()
Wend
'Getting entered Numbers
Dim Top, Middle, Bottom, All
Top = Request.form("Top")
Middle = Request.Form("Mid")
Bottom = Request.Form("Bot")
'Ensuring Integer Values
Top = CInt(Top)
Middle = CInt(Middle)
Bottom = CInt(Bottom)
Total = Top + Middle + Bottom
'Generating Recommended Split
If GndOfficerCount/3 = Int(GndOfficerCount/3) then
    rectop = GndOfficerCount/3
    recmid = GndOfficerCount/3
    recbot = GndOfficerCount/3
elseif (GndOfficerCount/3) > Round(GndOfficerCount/3) then
    rectop = Int(GndOfficerCount/3) + 1
    recmid = Int(GndOfficerCount/3)
    recbot = Int(GndOfficerCount/3)
else
    rectop = Int(GndOfficerCount/3) + 1
    recmid = Int(GndOfficerCount/3) + 1
    recbot = Int(GndOfficerCount/3)
end if
'=====Manual
Code=====
%>
.
.
.
<%
'=====Manual
Code=====
If Total = GndOfficerCount Then
'Resetting Recordset
rsGndOfficers.MoveFirst

'The Loop assigning each Officer to his/her's Third
Dim iLoop
For iLoop = 1 to GndOfficerCount

```

```

strOID = (rsGndOfficers.Fields.Item("OID").Value)
    If iLoop <= Top then
        strSQL = "UPDATE OFFICER SET Third = '1' WHERE
OID = " & strOID

        Elseif iLoop <= (Top + Middle) then
            strSQL = "UPDATE OFFICER SET Third = '2'
WHERE OID = " & strOID

            Elseif iLoop <= Total then
                strSQL = "UPDATE OFFICER SET Third = '3'
WHERE OID = " & strOID

            end if

CommandUD.Execute strSQL
rsGndOfficers.MoveNext()
Next
'=====Manual
Code=====
%>

```

G. XO_COMPANY_ROSTER_MODIFY_CODE.ASP

This code allows the CO/XO to modify select lieutenant information.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

'Getting information from the form
Dim iCount
iCount = Request.Form("Count")

Dim iLoop
For iLoop = 0 to iCount

```

```

strOID = Request(iLoop & ".OID")
strAirQual = Request(iLoop & ".GndAirQual")
strNFOQual = Request(iLoop & ".GndNFOQual")
strContract = Request(iLoop & ".Contract")
strRank = Request(iLoop & ".Rank")
strEMail = Request(iLoop & ".EMail")
strCheck = Request(iLoop & ".Check")

'Required values for SQL to work properly when form value
is null
if strAirQual <> "True" then
    strAirQual = "False"
end if
if strNFOQual <> "True" then
    strNFOQual = "False"
end if
if strRank = "" then
    strRank = 0
end if
if strEMail = "" then
    strEMail = "None"
end if

'Generating and executing a delete or update SQL statement
if strCheck = "Remove" then
    strSQL = "DELETE FROM OFFICER WHERE OID = " & strOID
else
    strSQL = "UPDATE OFFICER SET GndAirQual = " &
strAirQual & ", GndNFOQual = " & strNFOQual & ",
Class_Standing = '" & strRank & "', Contract = '" &
strContract & "', E_Mail = '" & strEMail & "'" WHERE OID = "
& strOID
end if

CommandUD.Execute strSQL

Next

CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

H. **XO_INSTRUCTION_ADD_EDIT_CODE.ASP**

The following code allows the CO/XO to add, modify and delete the log-in announcements.

```
<%
'=====Manual
Code=====
Response.Buffer = True

'Getting information from the form
Dim iCount
iCount = Request.Form("Count")

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

'Inserting a record if something exists in Remarks
addRemarks = Request("add.Remarks")
addExpires = Request("add.Expires")

'Setting Default expiration date to 7 days after day
entered
if addExpires = "" then
addExpires = (DATE() + 7)
end if

'Generating and executing an insert SQL statement
if addRemarks <> "" then
    strSQL = "INSERT INTO INSTRUCTIONS ( Company, Remarks,
Expires ) Values ('" & Session("Company") & "', '" &
addRemarks & "', '" & addExpires & "')"

CommandUD.Execute strSQL
end if

'Getting information from the form
Dim iLoop
For iLoop = 0 to iCount
strRemarks = Request(iLoop & ".Remarks")
strExpires = Request(iLoop & ".Expires")
strID = Request(iLoop & ".ID")
```



```

strCheck = Request(iLoop & ".Check")

'Generating and executing a delete or update SQL statement
if strCheck = "Remove" then
    strSQL = "DELETE FROM INSTRUCTIONS WHERE AutoID = " &
strID
else
    strSQL = "UPDATE INSTRUCTIONS SET Remarks = '" &
strRemarks & "' , Expires = #" & strExpires & "# WHERE
AutoID = " & strID
end if

CommandUD.Execute strSQL
Next

CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

I. XO_LINEAL_ASSIGNMENT_CODE.ASP

The following code assigns each lieutenant an MOS based on their lineal standing and MOS choices.

```

<%
'=====Manual
Code=====
Response.Buffer = True

'Declare variables needed to execute the SQL statement
Dim strSQL

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open
'=====Manual
Code=====
%>
.
.
.
<%

```

```

'=====Manual
Code=====
'Clearing the Initial MOS's for the Gnd Officers
While (NOT rsGndOfficers.EOF)
    strSQLclear = "UPDATE OFFICER SET Initial_MOS = '0'
WHERE OID = " & (rsGndOfficers.Fields.Item("OID").Value)
    CommandUD.Execute strSQLclear
rsGndOfficers.MoveNext()
Wend

'Clearing the Officer Last Filled Field
    strSQLLastFilled = "UPDATE MOSASSIGNMENTNUMBERS SET
MOSASSIGNMENTNUMBERS.Top_Last_Officer_Standing = 'N/A',
MOSASSIGNMENTNUMBERS.Mid_Last_Officer_Standing = 'N/A',
MOSASSIGNMENTNUMBERS.Bot_Last_Officer_Standing = 'N/A'
WHERE
(( (MOSASSIGNMENTNUMBERS.Company)='"&Session("Company")&"'))
;"
    CommandUD.Execute strSQLLastFilled

'The Loop assigning each Officer to his/her's MOS
Dim AvailMOS (30,30)

'Assigning MOS's to an Array
Dim iLoop
For iLoop = 1 to
(rsMOSCount.Fields.Item("CountOfMOS").Value)
    AvailMOS (iLoop,0) =
(rsAvailMOSSs.Fields.Item("MOS").Value)
    AvailMOS (iLoop,1) =
(rsAvailMOSSs.Fields.Item("Top3rd").Value)
    AvailMOS (iLoop,2) =
(rsAvailMOSSs.Fields.Item("Mid3rd").Value)
    AvailMOS (iLoop,3) =
(rsAvailMOSSs.Fields.Item("Bot3rd").Value)
    AvailMOS (iLoop,5) =
(rsAvailMOSSs.Fields.Item("AutoNumber").Value)
    rsAvailMOSSs.MoveNext()
Next

'Assigning Officers to an available MOS
Dim Assigned
Assigned = "N"

Dim iLoopall

```

```

For iLoopall = 1 to
(rsChoiceCount.Fields.Item("CountOfCompany").Value)
    If Assigned = "Y" and
(rsOfficerChoices.Fields.Item("Choice").Value) = 1 then
        Assigned = "N"
    end if
For iLoop = 1 to
(rsMOSCount.Fields.Item("CountOfMOS").Value)

'Assigning Officers in the Top Third
    If Assigned = "N" and
(rsOfficerChoices.Fields.Item("Third").Value) = 1 and
AvailMOS(iLoop,0) =
(rsOfficerChoices.Fields.Item("MOS").Value) and AvailMOS
(iLoop,1) > 0 then

        strSQL = "UPDATE OFFICER SET Initial_MOS = '" &
(rsOfficerChoices.Fields.Item("MOS").Value) & "' WHERE OID
= " & (rsOfficerChoices.Fields.Item("OID").Value)
        CommandUD.Execute strSQL
        Assigned = "Y"
        AvailMOS (iLoop, 1) = AvailMOS (iLoop, 1) - 1
'Updating the last Officer filled field
        If AvailMOS (iLoop, 1) = 0 then
            strSQLlastfill = "UPDATE MOSASSIGNMENTNUMBERS SET
Top_Last_Officer_Standing = '" &
(rsOfficerChoices.Fields.Item("Class_Standing").Value) & "'
WHERE AutoNumber = " & AvailMOS (iLoop,5)
            CommandUD.Execute strSQLlastfill
        end if
    end if

'Assigning Officers in the Middle Third
    If Assigned = "N" and
(rsOfficerChoices.Fields.Item("Third").Value) = 2 and
AvailMOS(iLoop,0) =
(rsOfficerChoices.Fields.Item("MOS").Value) and AvailMOS
(iLoop,2) > 0 then

        strSQL = "UPDATE OFFICER SET Initial_MOS = '" &
(rsOfficerChoices.Fields.Item("MOS").Value) & "' WHERE OID
= " & (rsOfficerChoices.Fields.Item("OID").Value)

        CommandUD.Execute strSQL
        Assigned = "Y"
        AvailMOS (iLoop, 2) = AvailMOS (iLoop, 2) - 1

```

```

'Updating the last Officer filled field
    If AvailMOS (iLoop, 1) = 0 then
        strSQLlastfill = "UPDATE MOSASSIGNMENTNUMBERS SET
Mid_Last_Officer_Standing = '" &
(rsOfficerChoices.Fields.Item("Class_Standing").Value) & "'
WHERE AutoNumber = " & AvailMOS (iLoop,5)
        CommandUD.Execute strSQLlastfill
    end if
end if

'Assigning Officers in the Bottom Third
    If Assigned = "N" and
(rsOfficerChoices.Fields.Item("Third").Value) = 3 and
AvailMOS(iLoop,0) =
(rsOfficerChoices.Fields.Item("MOS").Value) and AvailMOS
(iLoop,3) > 0 then

        strSQL = "UPDATE OFFICER SET Initial_MOS = '" &
(rsOfficerChoices.Fields.Item("MOS").Value) & "' WHERE OID
= " & (rsOfficerChoices.Fields.Item("OID").Value)
        CommandUD.Execute strSQL
        Assigned = "Y"
        AvailMOS (iLoop, 3) = AvailMOS (iLoop, 3) - 1
'Updating the last Officer filled field
        If AvailMOS (iLoop, 1) = 0 then
            strSQLlastfill = "UPDATE MOSASSIGNMENTNUMBERS SET
Bot_Last_Officer_Standing = '" &
(rsOfficerChoices.Fields.Item("Class_Standing").Value) & "'
WHERE AutoNumber = " & AvailMOS (iLoop,5)
            CommandUD.Execute strSQLlastfill
        end if
    end if
Next
    rsOfficerChoices.MoveNext()
Next

'Update Choice Received Number
'Generating and executing an update SQL statement to clear
any existing data
strSQLClearing = "UPDATE OFFICER SET OFFICER.Choice_Number
= 0 WHERE (((OFFICER.Level)='Student') AND
((OFFICER.Contract) Like 'Gnd%') AND ((OFFICER.Company)=''"&
Session("Company")&"'));"

CommandUD.Execute strSQLClearing

```

```
'Generating and executing an update SQL statement
strSQLUpdate = "UPDATE OFFICER INNER JOIN OFFICER_MOSMAIN
ON OFFICER.OID = OFFICER_MOSMAIN.OID SET
OFFICER.Choice_Number = [OFFICER_MOSMAIN]![Choice] WHERE
(((OFFICER.Level)='Student') AND ((OFFICER.Contract) Like
'Gnd%') AND ((OFFICER.Company)='" & Session("Company") &
"') AND ((OFFICER_MOSMAIN.MOS)=[Officer]![Initial_MOS]));"
```

```
CommandUD.Execute strSQLUpdate
```

```
CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>
```

J. XO_MOS_CHOICE_LOCK_CODE.ASP

The following code prevents a lieutenant from changing his or her choices.

```
<%
'=====Manual
Code=====
Response.Buffer = True

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open
'=====Manual
Code=====
%>
.
.
.
<%
'=====Manual
Code=====
If
(rsChoiceLocked.Fields.Item("MOS_Choice_Changes_Locked").Value) = "True" then

'Generating and executing an update SQL statement to allow
MOS Choice changes.
```

```

        strSQL = "UPDATE COMPANY SET MOS_Choice_Changes_Locked
= False WHERE AutoID = " &
(rsChoiceLocked.Fields.Item("AutoID").Value)

CommandUD.Execute strSQL
'=====Manual
Code=====
%>
        <p align="center"><font color="#00FF00"
size="+1">Now, Your Lt's CAN make
        changes to their MOS Choices.</font></p>
<%
'=====Manual
Code=====
else

'Generating and executing an update SQL statement to
prevent MOS Choice changes.
        strSQL = "UPDATE COMPANY SET MOS_Choice_Changes_Locked
= True WHERE AutoID = " &
(rsChoiceLocked.Fields.Item("AutoID").Value)

CommandUD.Execute strSQL
'=====Manual
Code=====
%>
        <p align="center"><font color="#FF0000"
size="+1">Now, Your Lt's can NOT make changes to
        their MOS Choices.</font></p>
        <% end if %>
        <p align="center"><font size="+1">Please wait one
moment...</font></p>
<%
'=====Manual
Code=====
CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

K. XO_MOS_DISTRIBUTION_ADD_CODE.ASP

The following code allows the CO/XO to enter MOS distribution information.

```

<%
'=====Manual
Code=====
Response.Buffer=True

'Getting information from the form
Dim iCount
iCount = Request.Form("Count")

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

Dim strMOSadd, strTopadd, strMidadd, strBotadd

'Getting information from the form
For iLoop = 1 to (iCount-1)
    strMOSadd = Request(iLoop & ".MOS")
    strTopadd = Request(iLoop & ".Top")
    strMidadd = Request(iLoop & ".Mid")
    strBotadd = Request(iLoop & ".Bot")

'Checking MOS Inputs for errors.
if Not IsNumeric(strTopadd) Then
strTopadd = 0
    else if strTopadd < 0 or strTopadd > 40 then
        strTopadd = 0
    end if
end if
if Not IsNumeric(strMidadd) Then
strMidadd = 0
    else if strMidadd < 0 or strMidadd > 40 then
        strMidadd = 0
    end if
end if
if Not IsNumeric(strBotadd) Then
strBotadd = 0
    else if strBotadd < 0 or strBotadd > 40 then
        strBotadd = 0
    end if
end if

'Generating and executing an insert SQL statement

```

```
strSQL = "INSERT INTO MOSASSIGNMENTNUMBERS ( MOS, Company,
Top3rd, Mid3rd, Bot3rd ) Values ('" & strMOSadd & "', '" &
Session("Company") & "', '" & strTopadd & "', '" &
strMidadd & "', '" & strBotadd & "')
```

```
CommandUD.Execute strSQL
```

```
Next
```

```
CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>
```

L. XO_MOS_DISTRIBUTION_MODIFY_CODE.ASP

The following code allows the CO/XO to modify their MOS distribution.

```
<%
'=====Manual
Code=====
Response.Buffer=True

'Getting information from the form
Dim iCount
iCount = Request.Form("Count")

Dim strIDupdate, strTopupdate, strMidupdate, strBotupdate
Dim topSQL, midSQL, botSQL
Dim iLoop

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

'Getting information from the form
For iLoop = 1 to (iCount-1)
    strIDupdate = Request(iLoop & ".ID")
    strTopupdate = Request(iLoop & ".Top")
    strMidupdate = Request(iLoop & ".Mid")
    strBotupdate = Request(iLoop & ".Bot")

'Checking MOS Inputs for errors.
```



```

if Not IsNumeric(strTopupdate) Then
strTopupdate = 0
    else if strTopupdate < 0 or strTopupdate > 40 then
        strTopupdate = 0
    end if
end if
if Not IsNumeric(strMidupdate) Then
strMidupdate = 0
    else if strMidupdate < 0 or strMidupdate > 40 then
        strMidupdate = 0
    end if
end if
if Not IsNumeric(strBotupdate) Then
strBotupdate = 0
    else if strBotupdate < 0 or strBotupdate > 40 then
        strBotupdate = 0
    end if
end if

'Generating and executing update SQL statements for each
third
topSQL = "UPDATE MOSASSIGNMENTNUMBERS SET Top3rd = '" &
strTopupdate & "'" WHERE AutoNumber = " & strIDupdate

midSQL = "UPDATE MOSASSIGNMENTNUMBERS SET Mid3rd = '" &
strMidupdate & "'" WHERE AutoNumber = " & strIDupdate

botSQL = "UPDATE MOSASSIGNMENTNUMBERS SET Bot3rd = '" &
strBotupdate & "'" WHERE AutoNumber = " & strIDupdate

CommandUD.Execute topSQL
CommandUD.Execute midSQL
CommandUD.Execute botSQL

Next

CommandUD.Close
set CommandUD = Nothing
'=====Manual
Code=====
%>

```

M. ALL_FEEDBACK_CODE.ASP

The following is used to allow/write web site user feedback.

```

<%
'=====Manual
Code===== Response.Buffer = True

'Create the DB connection
Dim CommandUD
set CommandUD = Server.CreateObject("ADODB.Connection")
CommandUD.ConnectionString = MM_TBSMOSConnection_STRING
CommandUD.Open

'Getting information from the form
Remarks = Request.Form("Remarks")
Category = Request.Form("Category")

'Assigning feedback variables if the user is not logged in
If Session("MM_Username") = "" then
    Rank = Request.Form("Rank")
    FirstName = Request.Form("FirstName")
    LastName = Request.Form("LastName")
    Unit = Request.Form("Unit")
    EMail = Request.Form("E-mail")
    NextPage = "Default.asp"

'Assigning feedback variables to a logged in user
else
    Rank = (rsOfficer.Fields.Item("Rank").Value)
    FirstName =
(rsOfficer.Fields.Item("First_Name").Value)
    LastName = (rsOfficer.Fields.Item("Last_Name").Value)
    Unit = (rsOfficer.Fields.Item("Platoon").Value) & ", "
& (rsOfficer.Fields.Item("Company").Value)
    EMail = (rsOfficer.Fields.Item("E-Mail").Value)
    NextPage = "All_Welcome.asp"

end if

'Generating and executing an insert SQL statement
strSQL = "INSERT INTO WEB_SITE_FEEDBACK ( Category, EMail,
Rank, FirstName, LastName, Unit, Remarks ) Values ('" &
Category & "', '" & EMail & "', '" & Rank & "', '" &
FirstName & "', '" & LastName & "', '" & Unit & "', '" &
Remarks & "'" )"

CommandUD.Execute strSQL

```

```
CommandUD.Close  
set CommandUD = Nothing  
'=====Manual  
Code=====
```

```
%>
```

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APPENDIX C: DETAILED STATISTICAL RESULTS

A. STATISTICAL RESULTS

1. Alpha Company

a. *Lineal Assignment.*

(1) Count of assignments by Choice Number.

	Third			
Choice Number	1	2	3	Grand Total
1	19	27	24	70
2	6	7	6	19
3	3	6	5	14
4	4	2	4	10
5	7	3	3	13
6	1	1	1	3
7	2	2	1	5
8	1	1		2
9	2			2
10	1	1		2
11	1		1	2
12	1	1		2
13			1	1
14	3		1	4
16		1	2	3
17	1			1
19	2		1	3
20			2	2
21		2	2	4
Grand Total	54	54	54	162

(2) Count of assignments grouped by choice number.

	Third		
Group	1	2	3
Top 5	39	45	42
6-10	7	5	2
11-15	5	1	3
>16	3	3	7
Grand Total	54	54	54

(3) Model totals grouped by choice number

Group	Lineal
Top 5	126
6-10	14
11-15	9
>16	13
Total	162

(4) Change from the lineal assignment method grouped by choice number.

Group	Lineal
Top 5	0
6-10	0
11-15	0
>16	0

(5) Percentages grouped by choice number.

Group	Lineal
Top 5	78%
6-10	9%
11-15	6%
>16	8%
Total	100%

(6) Average choice number assigned.

Lineal	4.5
--------	-----

(7) Count of lieutenants who did not receive a top five choice.

Lineal
36

b. As-Is Assignment.

(1) Count of assignments by Choice Number.

	Third			
Choice Number	1	2	3	Grand Total
1	18	15	19	52
2	6	11	5	22
3	3	4	6	13
4	1	2	1	4
5	2	1	2	5
6	1	1	2	4
7	2			2
8	1	1	1	3
9	1			1
10			1	1
11	1	1		2
12		1		1
13		1		1
15	1		1	2
16	1	1		2
18	1			1
Grand Total	39	39	38	116

(2) Count of assignments by grouped choice number.

	Third		
	1	2	3
Top 5	30	33	33
6-10	5	2	4
11-15	2	3	1
>16	2	1	0
Grand Total	39	39	38

(3) Totals grouped by choice number

Top 5	Grand Total
6-10	96
11-15	11
>16	6
Total	3
	116

(4) Change from the lineal assignment method, grouped by choice number.

Change from Lineal	As-Is
Top 5	143
6-10	8
11-15	6
>16	5

(5) Percentages grouped by choice number.

	As-Is
Top 5	88%
6-10	5%
11-15	4%
>16	3%
Total	100%

(6) Average choice number assigned.

As-Is	3.5

(7) Count of lieutenants who did not receive a top five choice.

As-Is
19

c. Optimized As-Is Assignment.

(1) Count of assignments by Choice Number.

Count of OID	Third			
Opt As-Is	1	2	3	Grand Total
1	18	27	21	66
2	9	15	9	33
3	7	6	11	24
4	4		5	9
5	5	3	4	12
6	2	1	1	4
7	2	1	1	4
8	1	1		2
9	2		2	4
10	2			2
11	1			1
14	1			1
Grand Total	54	54	54	162

(2) Count of assignments grouped by choice number.

	Third		
Opt As-Is2	1	2	3
Top 5	43	51	50
6-10	9	3	4
11-15	2	0	0
Grand Total	54	54	54

(3) Totals grouped by choice number.

	Opt As-Is
Top 5	144
6-10	16
11-15	2
>16	0
Total	162

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt As-Is
Top 5	18
6-10	2
11-15	-7
>16	-13

(5) Model percentages grouped by choice number.

	Opt As-Is
Top 5	89%
6-10	10%
11-15	1%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt As-Is	2.8
-----------	-----

(7) Count of lieutenants who did not receive a top five choice.

Opt As-Is
18

d. Optimized Incremental

(1) Count of assignments by Choice Number.

Count of OID	Third			
Opt Incremental	1	2	3	Grand Total
1	28	25	22	75
2	15	10	9	34
3	4	7	10	21
4	3	2	7	12
5	1	3	4	8
6	1	2	2	5
7	2	4		6
8		1		1
Grand Total	54	54	54	162

(2) Count of assignments by grouped choice number.

	Third		
	1	2	3
Top 5	51	47	52
6-10	3	7	2
Grand Total	54	54	54

(3) Totals grouped by choice number.

Opt Incremental2	Grand Total
Top 5	150
6-10	12
Grand Total	162

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Incr
Top 5	24
6-10	-2
11-15	-9
>16	-13

(5) Model percentages grouped by choice number.

	Opt Incr
Top 5	93%
6-10	7%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Incr	2.3
----------	-----

(7) Count of lieutenants who did not receive a top five choice.

Opt Incr
12

e. Optimized Radical

(1) Count of assignments by Choice Number.

	Third			
Opt Radical	1	2	3	Grand Total
1	15	1	4	20
2	9	10	7	26
3	5	7	12	24
4	3	11	12	26
5	18	21	18	57
6	1	2	1	4
7	3	2		5
Grand Total	54	54	54	162

(2) Count of assignments by grouped choice number.

	Third		
Opt Radical	1	2	3
Top 5	50	50	53
6-10	4	4	1
Grand Total	54	54	54

(3) Totals grouped by choice number.

	Opt Rad
Top 5	153
6-10	9
11-15	0
>16	0
Total	162

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Rad
Top 5	27
6-10	-5
11-15	-9
>16	-13

(5) Model percentages grouped by choice number.

	Opt Rad
Top 5	94%
6-10	6%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Rad	3.7
---------	-----

(7) Count of lieutenants who did not receive a top five choice.

Opt Rad
9

2. Bravo Company

a. Lineal

(1) Count of assignments by Choice Number.

	Third			
Lineal	1	2	3	Grand Total
1	18	15	19	52
2	6	11	5	22
3	3	4	6	13
4	1	2	1	4
5	2	1	2	5
6	1	1	2	4
7	2			2
8	1	1	1	3
9	1			1
10			1	1
11	1	1		2
12		1		1
13		1		1
15	1		1	2
16	1	1		2
18	1			1
Grand Total	39	39	38	116

(2) Count of assignments by grouped choice number.

Lineal	Third		
	1	2	3
Top 5	30	33	33
6-10	5	2	4
11-15	2	3	1
>16	2	1	0
Grand Total	39	39	38

(3) Totals grouped by choice number.

Lineal	
	Grand Total
Top 5	96
6-10	11
11-15	6
>16	3
Grand Total	116

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Lineal
Top 5	0
6-10	0
11-15	0
>16	0

(5) Model percentages grouped by choice number.

	Lineal
Top 5	83%
6-10	9%
11-15	5%
>16	3%
Total	100%

(6) Average choice number assigned.

Lineal	3.3
--------	-----

b. As-Is. The as-is model has not yet been applied to this company.

c. Optimized As-Is Assignment.

(1) Count of assignments by Choice Number.

	Third			
Opt As-Is	1	2	3	Grand Total
1	19	12	19	50
2	6	13	8	27
3	4	9	5	18
4	2	2	5	9
5	4	2		6
6	2	1	1	4
7	2			2
Grand Total	39	39	38	116

(2) Count of assignments by grouped choice number.

Opt As-Is	Third		
	1	2	3
Top 5	35	38	37
6-10	4	1	1
11-15	0	0	0
>16	0	0	0
Grand Total	39	39	38

(3) Totals grouped by choice number.

Opt As-Is	
	Grand Total
Top 5	110
6-10	6
11-15	0
>16	0
Grand Total	116

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt As-Is
Top 5	14
6-10	-5
11-15	-6
>16	-3

(5) Model percentages grouped by choice number.

	Opt As-Is
Top 5	95%
6-10	5%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt As-Is	2.3
-----------	-----

d. Optimized Incremental

(1) Count of assignments by Choice Number.

	Third			
Opt Incremental	1	2	3	Grand Total
1	25	15	24	64
2	5	12	7	24
3	4	6	1	11
4	1	4	5	10
5	3	1	1	5
6	1	1		2
Grand Total	39	39	38	116

(2) Count of assignments by grouped choice number.

Opt Incr	Third		
	1	2	3
Top 5	38	38	38
6-10	1	1	0
11-15	0	0	0
>16	0	0	0
Grand Total	39	39	38

(3) Totals grouped by choice number.

Opt Incr	
	Grand Total
Top 5	114
6-10	2
11-15	0
>16	0
Grand Total	116

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Incr
Top 5	18
6-10	-9
11-15	-6
>16	-3

(5) Model percentages grouped by choice number.

	Opt Incr
Top 5	98%
6-10	2%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Incr	1.9
----------	-----

e. Optimized Radical

(1) Count of assignments by Choice Number.

	Third			
Opt Radical	1	2	3	Grand Total
1	9	10	14	33
2	10	11	6	27
3	6	6	7	19
4	14	12	11	37
Grand Total	39	39	38	116

(2) Count of assignments by grouped choice number.

Opt Rad	Third		
	1	2	3
Top 4	39	39	38
6-10	0	0	0
11-15	0	0	0
>16	0	0	0
Grand Total	39	39	38

(3) Totals grouped by choice number.

Opt Rad	
	Grand Total
Top 4	232
6-10	0
11-15	0
>16	0
Grand Total	232

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Rad
Top 5	18
6-10	-9
11-15	-6
>16	-3

(5) Model percentages grouped by choice number.

	Opt Rad
Top 5	98%
6-10	2%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Rad	2.5
---------	-----

3. Charlie Company

a. Lineal

(1) Count of assignments by Choice Number.

	Third			
Lineal	1	2	3	Grand Total
1	25	17	19	61
2	5	9	9	23
3	5	6	4	15
4		3	4	7
5		2	1	3
6	2	1	1	4
7	1		2	3
9	1	1		2
10			1	1
13	1	1		2
15			1	1
16		1		1
18	1		1	2
19	2	1		3
21	2	1	1	4
23		1		1
Grand Total	45	44	44	133

(2) Count of assignments by grouped choice number.

	Third		
	1	2	3
Top 5	35	37	37
6-10	4	2	4
11-15	1	1	1
>16	5	4	2
Grand Total	45	44	44

(3) Totals grouped by choice number.

	Opt Rad
Top 5	132
6-10	1
11-15	0
>16	0
Total	133

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Lineal
Top 5	0
6-10	0
11-15	0
>16	0

(5) Model percentages grouped by choice number.

	Lineal
Top 5	82%
6-10	8%
11-15	2%
>16	8%
Total	100%

(6) Average choice number assigned.

Lineal	3.9
--------	-----

b. Lineal As-Is

(1) Count of assignments by Choice Number.

	Third			
As-Is	1	2	3	Grand Total
1	25	17	18	60
2	5	9	9	23
3	5	6	4	15
4		3	4	7
5		2	1	3
6	2	1	2	5
7	1		2	3
9	1	1		2
10			1	1
11			1	1
13	1	1		2
16		1		1
18	1		1	2
19	2	1		3
21	2	1	1	4
23		1		1
Grand Total	45	44	44	133

(2) Count of assignments by grouped choice number.

	Third		
	1	2	3
Top 5	35	37	36
6-10	4	2	5
11-15	1	1	1
>16	5	4	2
Grand Total	45	44	44

(3) Totals grouped by choice number.

	Grand Total
Top 5	108
6-10	11
11-15	3
>16	11
Grand Total	133

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	As-Is
Top 5	-1
6-10	1
11-15	0
>16	0

(5) Model percentages grouped by choice number.

	As-Is
Top 5	81%
6-10	8%
11-15	2%
>16	8%
Total	100%

(6) Average choice number assigned.

As-Is	4.0
-------	-----

c. Optimized As-Is Assignment.

(1) Count of assignments by Choice Number.

	Third			
Opt As-Is	1	2	3	Grand Total
1	32	21	22	75
2	12	6	8	26
3	1	7	6	14
4		4	6	10
5		4	1	5
6		1	1	2
7		1		1
Grand Total	45	44	44	133

(2) Count of assignments by grouped choice number.

	Third		
	1	2	3
Top 5	45	42	43
6-10	0	2	1
11-15	0	0	0
>16	0	0	0
Grand Total	45	44	44

(3) Totals grouped by choice number.

	Grand Total
Top 5	130
6-10	3
11-15	0
>16	0
Grand Total	133

(4) Change from the lineal assignment method grouped by choice number.

	Opt As-Is
Top 5	130
6-10	3
11-15	0
>16	0
Total	133

(5) Model percentages grouped by choice number.

	Opt As-Is
Top 5	98%
6-10	2%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt As-Is	1.9
-----------	-----

d. Optimized Incremental

(1) Count of assignments by Choice Number.

	Third			
Opt Incremental	1	2	3	Grand Total
1	31	26	21	78
2	12	8	12	32
3	2	7	5	14
4		1	6	7
5		2		2
Grand Total	45	44	44	133

(2) Count of assignments by grouped choice number.

Opt Incr	Third		
	1	2	3
Top 5	45	44	44
6-10	0	0	0
11-15	0	0	0
>16	0	0	0
Grand Total	45	44	44

(3) Totals grouped by choice number.

Opt Incr	
	Grand Total
Top 5	133
6-10	0
11-15	0
>16	0
Grand Total	133

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Incr
Top 5	24
6-10	-10
11-15	-3
>16	-11

(5) Model percentages grouped by choice number.

	Opt Incr
Top 5	100%
6-10	0%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Incr	1.7
----------	-----

e. Optimized Radical

(1) Count of assignments by Choice Number.

Count of OID	Third			
Opt Radical	1	2	3	Grand Total
1	18	5	10	33
2	11	8	6	25
3	6	4	9	19
4	5	11	12	28
5	4	16	7	27
6	1			1
Grand Total	45	44	44	133

(2) Count of assignments by grouped choice number.

Opt Rad	Third		
	1	2	3
Top 5	44	44	44
6-10	1	0	0
11-15	0	0	0
>16	0	0	0
Grand Total	45	44	44

(3) Totals grouped by choice number.

Opt Rad	
	Grand Total
Top 5	132
6-10	1
11-15	0
>16	0
Grand Total	133

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Rad
Top 5	23
6-10	-9
11-15	-3
>16	-11

(5) Model percentages grouped by choice number.

	Opt Rad
Top 5	99%
6-10	1%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Rad	3.0
---------	-----

4. Delta Company

a. Lineal

(1) Count of assignments by Choice Number.

	Third			
Lineal	1	2	3	Grand Total
1	26	21	22	69
2	4	13	12	29
3	3	10	5	18
4	5	5	4	14
5	3	1	5	9
6	2	1		3
7	2	1	2	5
8	1		1	2
9	3	1	1	5
10	1		1	2
11	3	1	2	6
12	1	1	2	4
13	1	1		2
14	1	1	1	3
15		1		1
16	2	1		3
18	1			1
21		1		1
22	1	1		2
Grand Total	60	61	58	179

(2) Count of assignments by grouped choice number.

Lineal	Third		
	1	2	3
Top 5	41	50	48
6-10	9	3	5
11-15	6	5	5
>16	4	3	0
Grand Total	60	61	58

(3) Totals grouped by choice number.

Lineal	
	Grand Total
Top 5	139
6-10	15
11-15	8
>16	13
Grand Total	175

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Lineal
Top 5	0
6-10	0
11-15	0
>16	0

(5) Model percentages grouped by choice number.

	Lineal
Top 5	78%
6-10	8%
11-15	4%
>16	7%
Total	98%

(6) Average choice number assigned.

Lineal	4.2
--------	-----

b. Lineal As-Is

(1) Count of assignments by Choice Number.

	Third			
As-Is	1	2	3	Grand Total
1	25	21	24	70
2	4	12	10	26
3	4	9	7	20
4	5	6	4	15
5	4	1	7	12
6	4	6	1	11
7	2	1	1	4
9	2	1	1	4
10	1		1	2
11	1	1	1	3
12	1			1
13	4	1		5
14	1	1	1	3
15		1		1
16	1			1
18	1			1
Grand Total	60	61	58	179

(2) Count of assignments by grouped choice number.

As-Is	Third		
	1	2	3
Top 5	42	49	52
6-10	9	8	4
11-15	7	4	2
>16	2	0	0
Grand Total	60	61	58

(3) Totals grouped by choice number.

As-Is	
	Grand Total
Top 5	143
6-10	21
11-15	13
>16	2
Grand Total	179

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	As-Is
Top 5	4
6-10	6
11-15	5
>16	-11

(5) Model percentages grouped by choice number.

	As-Is
Top 5	80%
6-10	12%
11-15	7%
>16	1%
Total	100%

(6) Average choice number assigned.

As-Is	3.6
-------	-----

c. Optimized As-Is Assignment.

(1) Count of assignments by Choice Number.

	Third			
Opt As-Is	1	2	3	Grand Total
1	24	26	26	76
2	7	13	16	36
3	7	10	4	21
4	4	4	7	15
5	5	3	1	9
6	1	2	3	6
7	3		1	4
8	1	2		3
9	1			1
10		1		1
11	2			2
12	1			1
13	1			1
14	2			2
15	1			1
Grand Total	60	61	58	179

(2) Count of assignments by grouped choice number.

Opt As-Is	Third		
	1	2	3
Top 5	47	56	54
6-10	6	5	4
11-15	7	0	0
>16	0	0	0
Grand Total	60	61	58

(3) Totals grouped by choice number.

Opt As-Is	
	Grand Total
Top 5	157
6-10	15
11-15	7
>16	0
Grand Total	179

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt As-Is
Top 5	18
6-10	0
11-15	-1
>16	-13

(5) Model percentages grouped by choice number.

	Opt As-Is
Top 5	88%
6-10	8%
11-15	4%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt As-Is	2.9
-----------	-----

d. Optimized Incremental

(1) Count of assignments by Choice Number.

	Third			
Opt Incremental	1	2	3	Grand Total
1	35	27	20	82
2	4	14	14	32
3	3	12	6	21
4	8	4	9	21
5	2	1	5	8
6	2	1	3	6
7	3		1	4
8	1			1
9	1			1
12		2		2
14	1			1
Grand Total	60	61	58	179

(2) Count of assignments by grouped choice number.

Opt Incr	Third		
	1	2	3
Top 5	52	58	54
6-10	7	1	4
11-15	1	2	0
>16	0	0	0
Grand Total	60	61	58

(3) Totals grouped by choice number.

Opt Incr	
	Grand Total
Top 5	164
6-10	12
11-15	3
>16	0
Grand Total	179

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Incr
Top 5	25
6-10	-3
11-15	-5
>16	-13

(5) Model percentages grouped by choice number.

	Opt Incr
Top 5	92%
6-10	7%
11-15	2%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Incr	2.5
----------	-----

e. Optimized Radical

(1) Count of assignments by Choice Number.

	Third			
Opt Radical	1	2	3	Grand Total
1	20	7	13	40
2	8	5	12	25
3	9	14	8	31
4	10	12	13	35
5	8	21	8	37
6	2		2	4
7	2		2	4
12	1	2		3
Grand Total	60	61	58	179

(2) Count of assignments by grouped choice number.

Opt Rad	Third		
	1	2	3
Top 5	55	59	54
6-10	4	0	4
11-15	1	1	1
>16	0	0	0
Grand Total	60	60	59

(3) Totals grouped by choice number.

Opt Rad	
	Grand Total
Top 5	168
6-10	8
11-15	3
>16	0
Grand Total	179

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Rad
Top 5	29
6-10	-7
11-15	-5
>16	-13

(5) Model percentages grouped by choice number.

	Opt Rad
Top 5	94%
6-10	4%
11-15	2%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Rad	3.3
---------	-----

5. Echo Company

a. Lineal

(1) Count of assignments by Choice Number.

	Third			
Lineal	1	2	3	Grand Total
1	19	25	23	67
2	9	8	10	27
3	1	4	4	9
4	2		2	4
5	1	1	1	3
6	2		1	3
7	1	1		2
8	1		2	3
9	2			2
10	1	1		2
11	2		1	3
12	1		1	2
13	2	1	1	4
14	1			1
15		1		1
17	1	1		2
19		1		1
20		1	1	2
21	1	2		3
Grand Total	47	47	47	141

(2) Count of assignments by grouped choice number.

Lineal	Third		
	1	2	3
Top 5	32	38	40
6-10	7	2	3
11-15	6	2	3
>16	2	5	1
Grand Total	47	47	47

(3) Totals grouped by choice number.

Lineal	
	Grand Total
Top 5	110
6-10	12
11-15	11
>16	8
Grand Total	141

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Lineal
Top 5	0
6-10	0
11-15	0
>16	0

(5) Model percentages grouped by choice number.

Change from Lineal	Lineal
Top 5	0
6-10	0
11-15	0
>16	0

(6) Average choice number assigned.

Lineal	4.0
--------	-----

b. As-Is

(1) Count of assignments by Choice Number.

	Third			
As-Is	1	2	3	Grand Total
1	18	22	22	62
2	6	8	9	23
3	3	4	5	12
4	4	2	2	8
5	2	4	3	9
6	3	1	2	6
7	2	2		4
8	2	2	2	6
9	1			1
10	1	1		2
11	2			2
12			1	1
13	1			1
14	1			1
20			1	1
21	1			1
22		1		1
Grand Total	47	47	47	141

(2) Count of assignments by grouped choice number.

As-Is	Third		
	1	2	3
Top 5	33	40	41
6-10	9	6	4
11-15	4	0	1
>16	1	1	1
Grand Total	47	47	47

(3) Totals grouped by choice number.

As-Is	
	Grand Total
Top 5	114
6-10	19
11-15	5
>16	3
Grand Total	141

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	As-Is
Top 5	4
6-10	7
11-15	-6
>16	-5

(5) Model percentages grouped by choice number.

	As-Is
Top 5	81%
6-10	13%
11-15	4%
>16	2%
Total	100%

(6) Average choice number assigned.

As-Is	3.4
-------	-----

c. Optimized As-Is Assignment.

(1) Count of assignments by Choice Number.

	Third			
Opt As-Is	1	2	3	Grand Total
1	16	24	23	63
2	11	8	14	33
3	3	4	5	12
4	4	2	2	8
5	2	3		5
6	2	2	1	5
7	3	1		4
8	2	1	2	5
9	1			1
10	1	1		2
11	1	1		2
13	1			1
Grand Total	47	47	47	141

(2) Count of assignments by grouped choice number.

Opt As-Is	Third		
	1	2	3
Top 5	36	41	44
6-10	9	5	3
11-15	2	1	0
>16	0	0	0
Grand Total	47	47	47

(3) Totals grouped by choice number.

Opt As-Is	
	Grand Total
Top 5	121
6-10	17
11-15	3
>16	0
Grand Total	141

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt As-Is
Top 5	11
6-10	5
11-15	-8
>16	-8

(5) Model percentages grouped by choice number.

	Opt As-Is
Top 5	86%
6-10	12%
11-15	2%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt As-Is	2.7
-----------	-----

d. Optimized Incremental

(1) Count of assignments by Choice Number.

	Third			
Opt Incremental	1	2	3	Grand Total
1	30	26	14	70
2	8	9	16	33
3	1	4	6	11
4	4	3	4	11
5	1	1	1	3
6	2	1	2	5
7	1		1	2
8		1	3	4
9		1		1
10		1		1
Grand Total	47	47	47	141

(2) Count of assignments by grouped choice number.

Opt Incr	Third		
	1	2	3
Top 5	44	43	41
6-10	3	4	6
11-15	0	0	0
>16	0	0	0
Grand Total	47	47	47

(3) Totals grouped by choice number.

Opt Incr	
	Grand Total
Top 5	128
6-10	13
11-15	0
>16	0
Grand Total	141

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Incr
Top 5	18
6-10	1
11-15	-11
>16	-8

(5) Model percentages grouped by choice number.

	Opt Incr
Top 5	91%
6-10	9%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

e. Optimized Radical

(1) Count of assignments by Choice Number.

	Third			
Opt Radical	1	2	3	Grand Total
1	14	9	4	27
2	7	9	13	29
3	4	10	9	23
4	9	7	10	26
5	10	10	7	27
6	2		1	3
7	1	2	3	6
Grand Total	47	47	47	141

(2) Count of assignments by grouped choice number.

Opt Rad	Third		
	1	2	3
Top 5	44	45	43
6-10	3	2	4
11-15	0	0	0
>16	0	0	0
Grand Total	47	47	47

(3) Totals grouped by choice number.

Opt Rad	
	Grand Total
Top 5	132
6-10	9
11-15	0
>16	0
Grand Total	141

(4) Change from the lineal assignment method grouped by choice number.

Change from Lineal	Opt Rad
Top 5	22
6-10	-3
11-15	-11
>16	-8

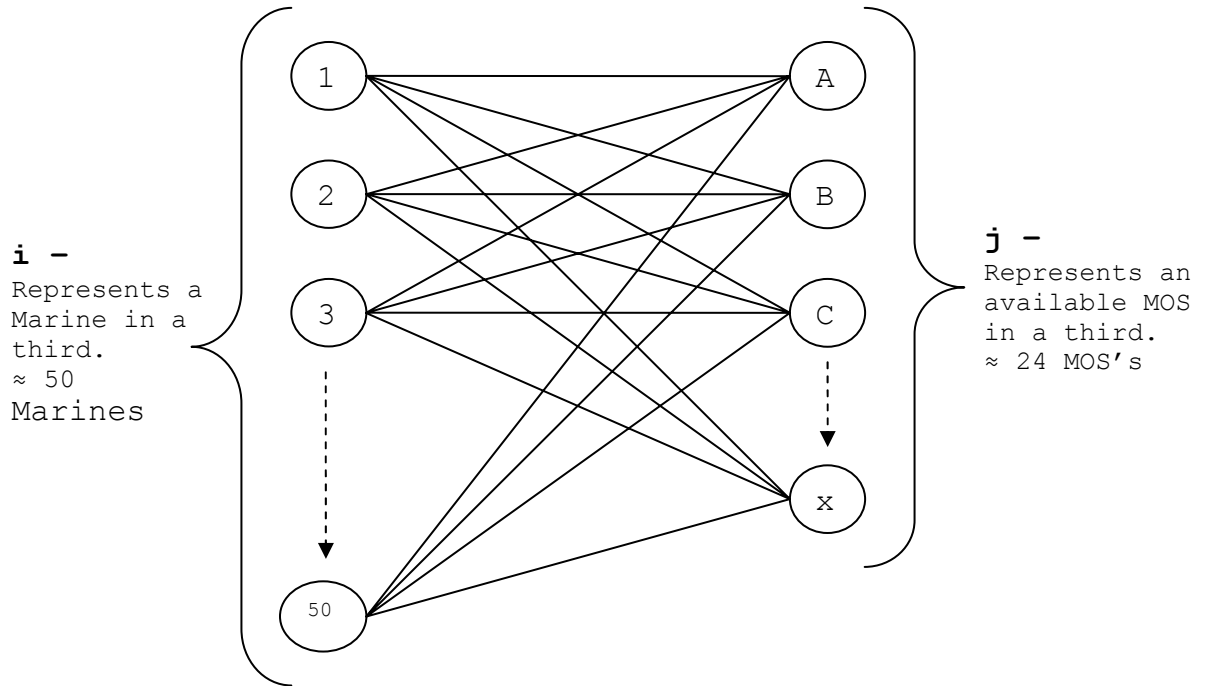
(5) Model percentages grouped by choice number.

	Opt Rad
Top 5	94%
6-10	6%
11-15	0%
>16	0%
Total	100%

(6) Average choice number assigned.

Opt Rad	3.2
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APPENDIX D: ASSIGNMENT MODEL GRAPHICAL REPRESENTATION



Objective Function: Min:

$$\approx 50 \left\{ \begin{aligned} &[(wc)X_{1a} + (wc)X_{1b} + (wc)X_{1c} + ..(\approx 24 \text{ elements})..(wc)X_{1x}] + \\ &[(wc)X_{2a} + (wc)X_{2b} + (wc)X_{2c} + ..(\approx 24 \text{ elements})..(wc)X_{2x}] + \\ &\quad \vdots \\ &[(wc)X_{50a} + (wc)X_{50b} + (wc)X_{50c} + ..(\approx 24 \text{ elements})..(wc)X_{50x}] \end{aligned} \right.$$

Subject To:

$$\begin{aligned} X_{1a} + X_{1b} + X_{1c} + ..(\approx 24 \text{ elements})..X_{1x} &= 1 \\ X_{2a} + X_{2b} + X_{2c} + ..(\approx 24 \text{ elements})..X_{2x} &= 1 \\ X_{3a} + X_{3b} + X_{3c} + ..(\approx 24 \text{ elements})..X_{3x} &= 1 \\ \vdots \\ X_{50a} + X_{50b} + X_{50c} + ..(\approx 24 \text{ elements})..X_{50x} &= 1 \end{aligned}$$

Assignment Constraint.
1 MOS per Lt.
≈ 50 constraints.

$$\begin{array}{l}
X_{1a} + X_{2a} + X_{3a} + \dots (\approx 50 \text{ elements}) \dots X_{50a} = (am_1) \\
X_{1b} + X_{2b} + X_{3b} + \dots (\approx 50 \text{ elements}) \dots X_{50b} = (am_2) \\
X_{1c} + X_{2c} + X_{3c} + \dots (\approx 50 \text{ elements}) \dots X_{50c} = (am_3) \\
\vdots \\
X_{1x} + X_{2x} + X_{3x} + \dots (\approx 50 \text{ elements}) \dots X_{50x} = (am_{24}) \\
X_{ij} \geq 0, \text{ for all } i \text{ \& } j
\end{array}
\left. \vphantom{\begin{array}{l} X_{1a} + X_{2a} + X_{3a} + \dots (\approx 50 \text{ elements}) \dots X_{50a} = (am_1) \\ X_{1b} + X_{2b} + X_{3b} + \dots (\approx 50 \text{ elements}) \dots X_{50b} = (am_2) \\ X_{1c} + X_{2c} + X_{3c} + \dots (\approx 50 \text{ elements}) \dots X_{50c} = (am_3) \\ \vdots \\ X_{1x} + X_{2x} + X_{3x} + \dots (\approx 50 \text{ elements}) \dots X_{50x} = (am_{24}) \\ X_{ij} \geq 0, \text{ for all } i \text{ \& } j \end{array}} \right\} \begin{array}{l} \text{Available MOS Constraint.} \\ \text{Varies per company.} \\ \approx 24 \text{ constraints.} \end{array}$$

APPENDIX E: SURVEY RESULTS

A. The following provides the results of the survey of Alpha Company Lieutenants. There were 178 respondents, 134 of whom did not have a guaranteed contract. The survey results include only those officers without guaranteed contracts.

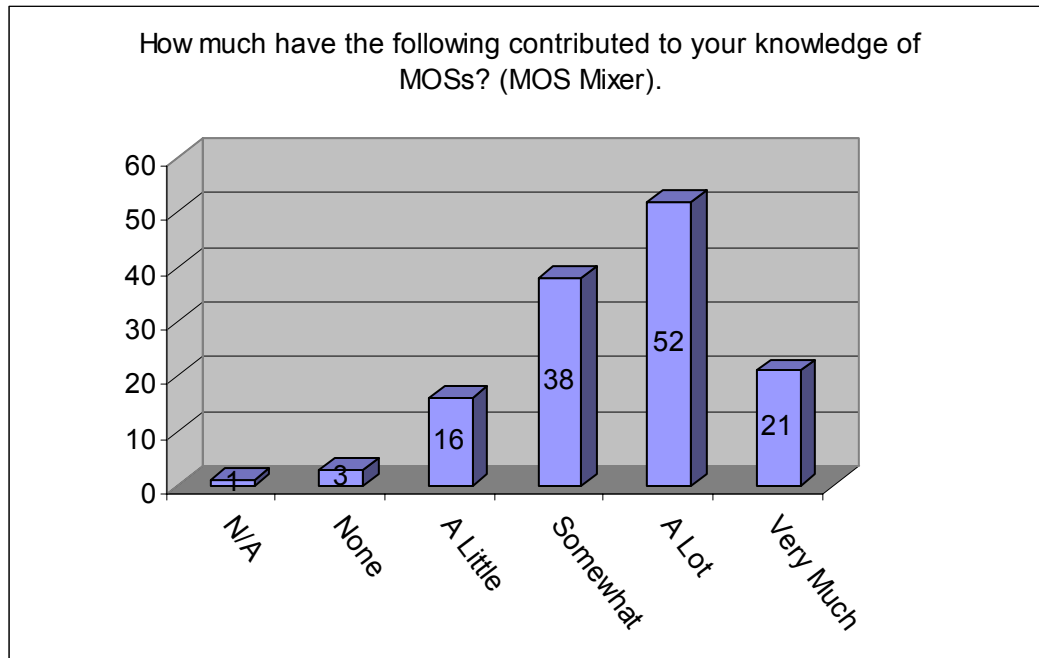
The value of the response was as follows:

Very Much	- 5
A Lot	- 4
Somewhat	- 3
A Little	- 2
None	- 1
Not Applicable	- 0

1. How much have the following contributed to your knowledge of MOSs?

a. MOS Mixers

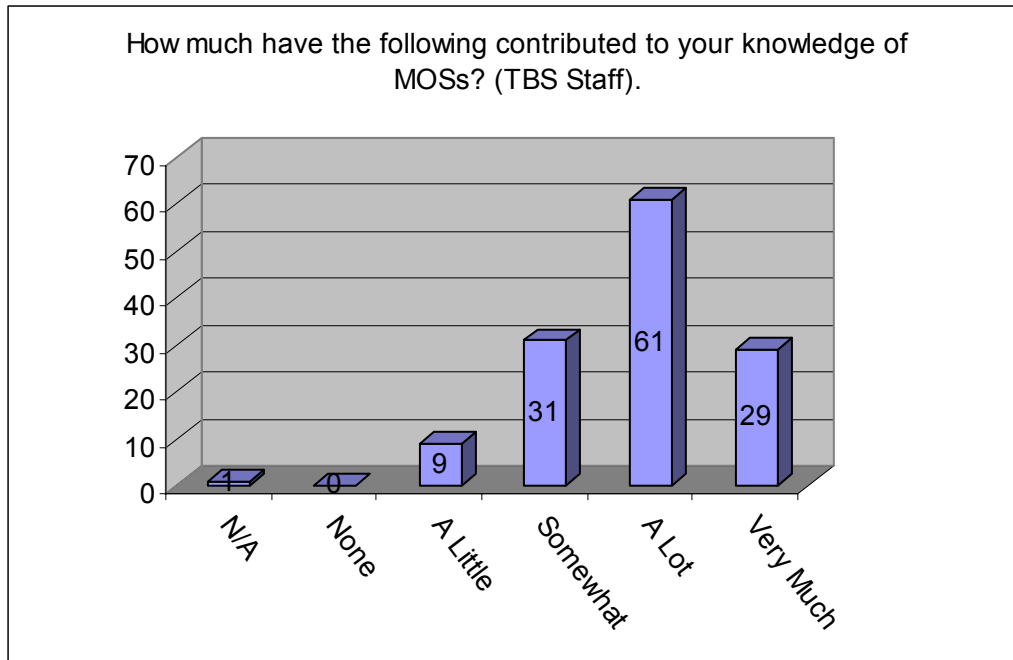
Average:	3.5
Median:	4



b. TBS Staff

Average: 3.8

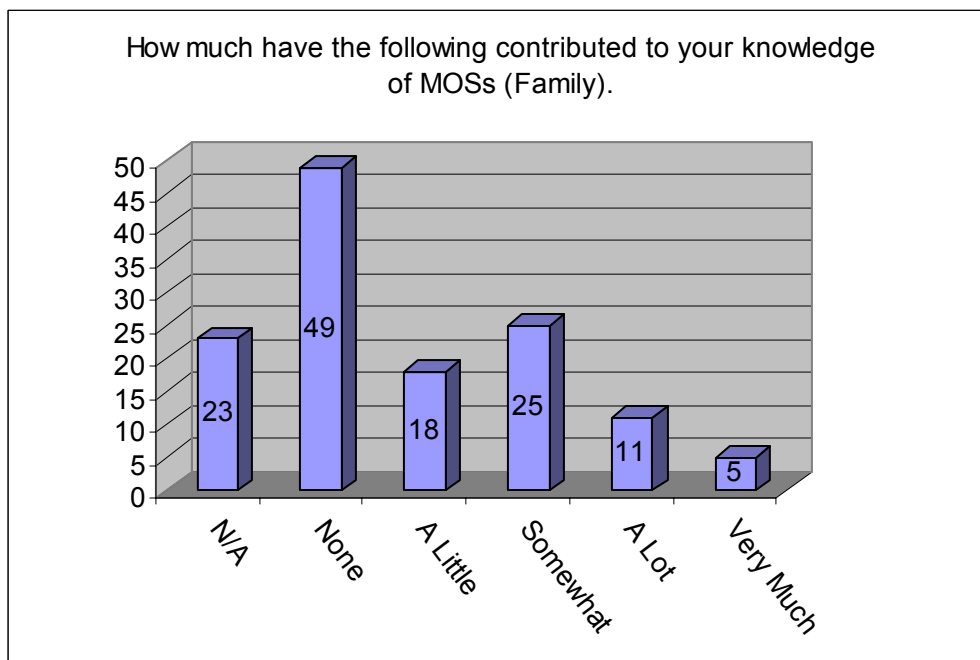
Median: 4



c. Family

Average: 1.7

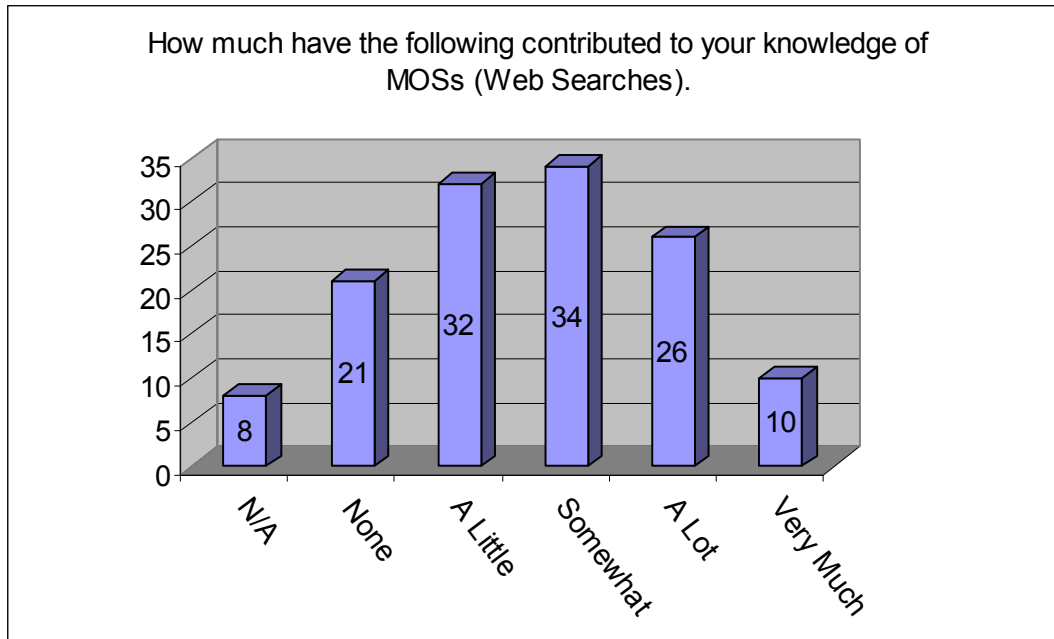
Median: 1



d. Web Searches

Average: 2.6

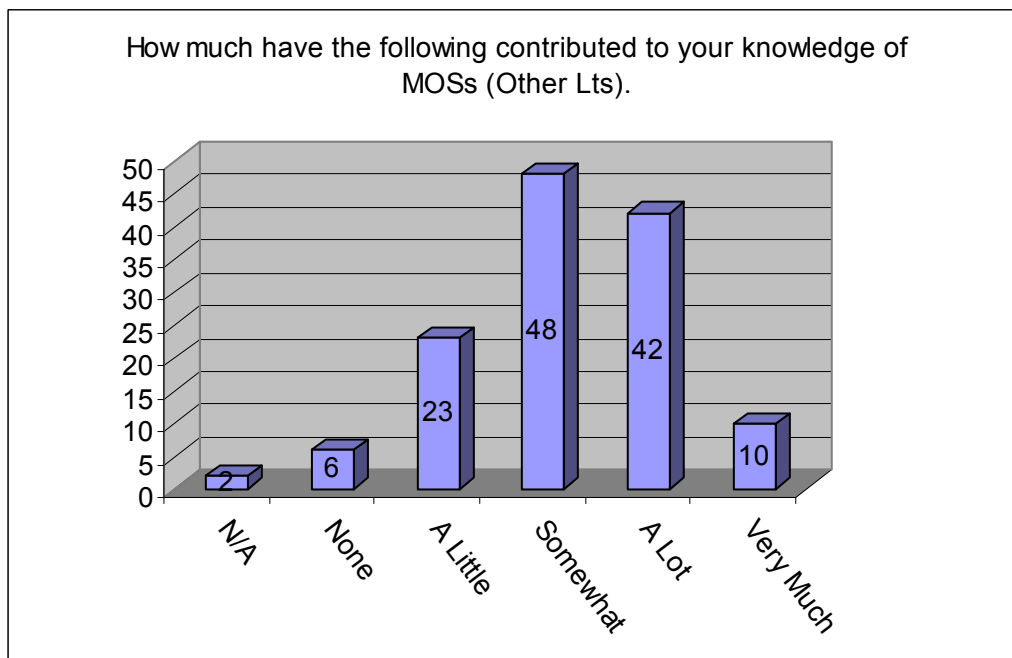
Median: 3



e. Other Lieutenants

Average: 3.1

Median: 3

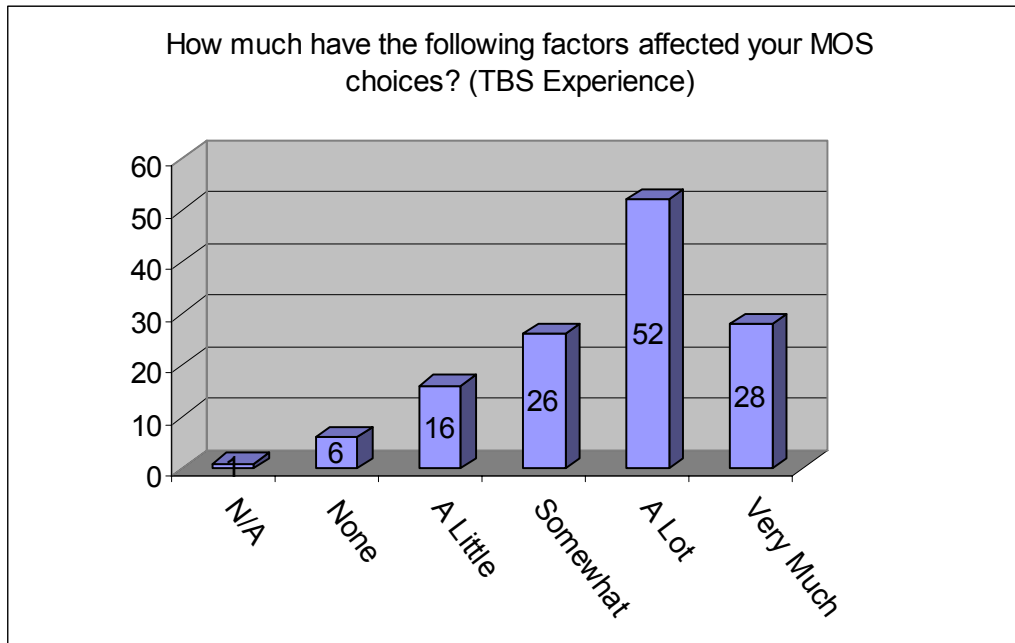


2. How much have the following factors affected your MOS choices?

a. TBS Experience

Average: 3.6

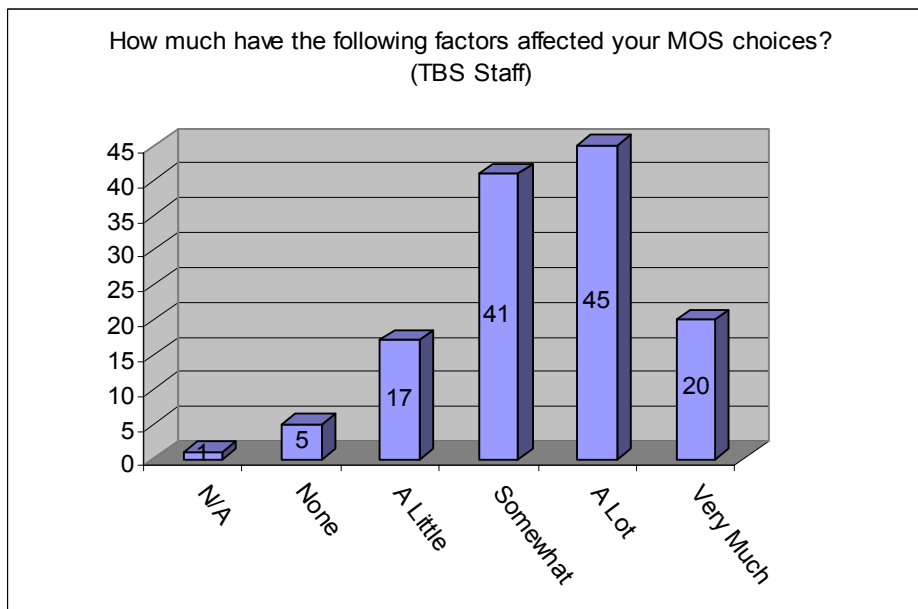
Median: 4



b. TBS Staff

Average: 3.4

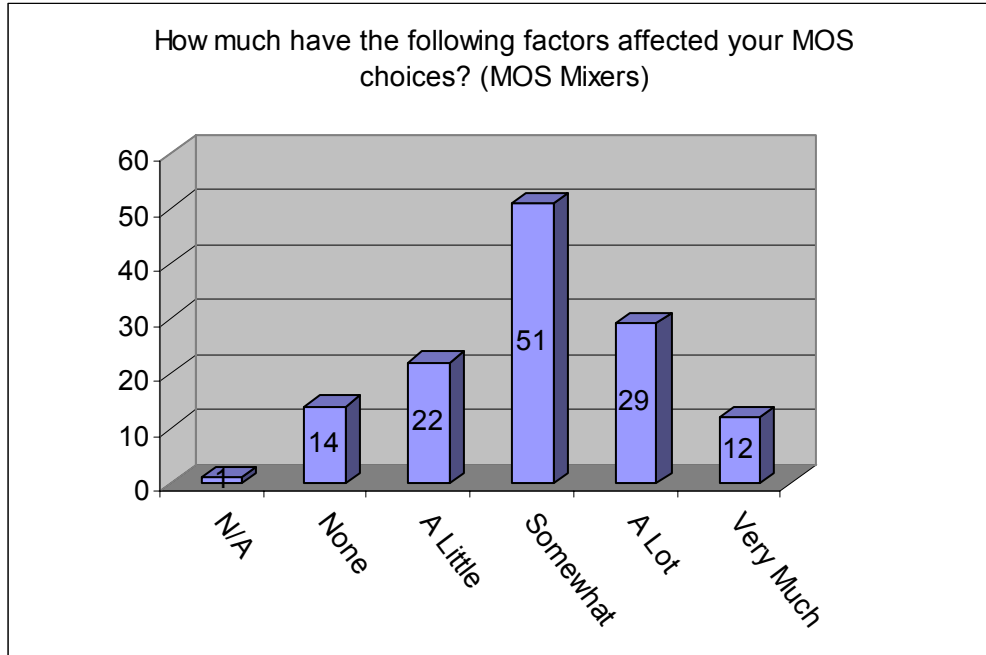
Median: 3



c. MOS Mixers

Average: 2.9

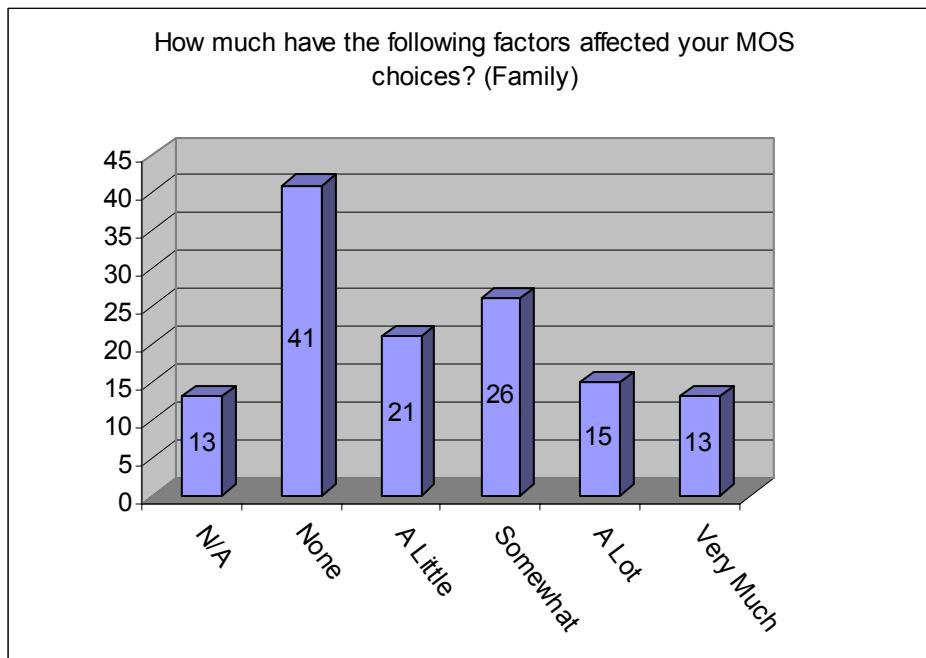
Median: 3



d. Family

Average: 2.2

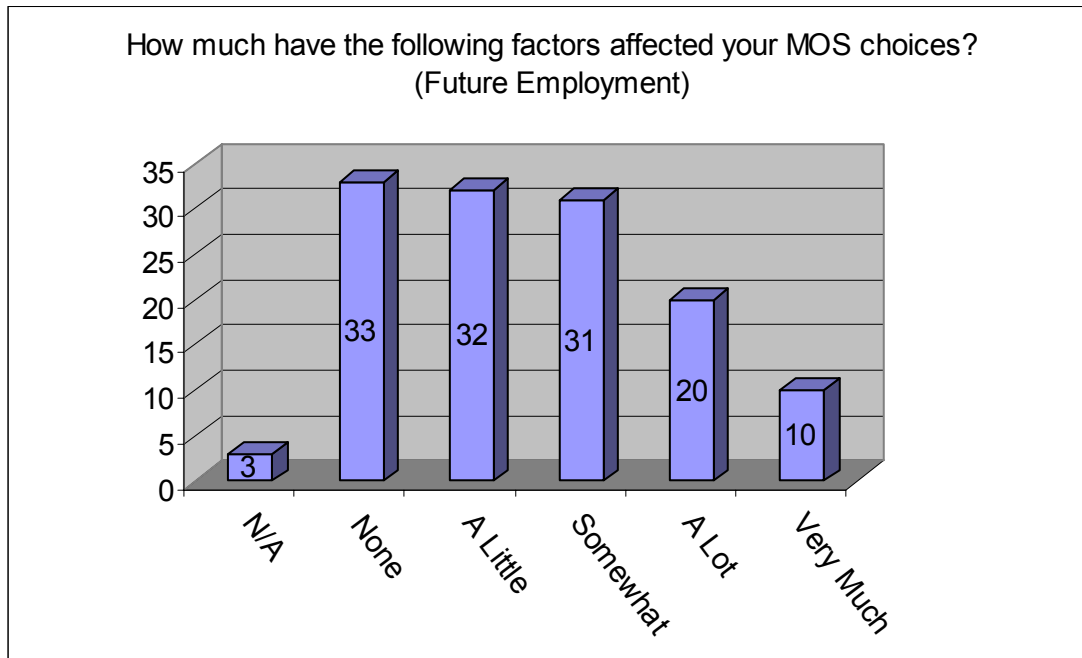
Median: 2



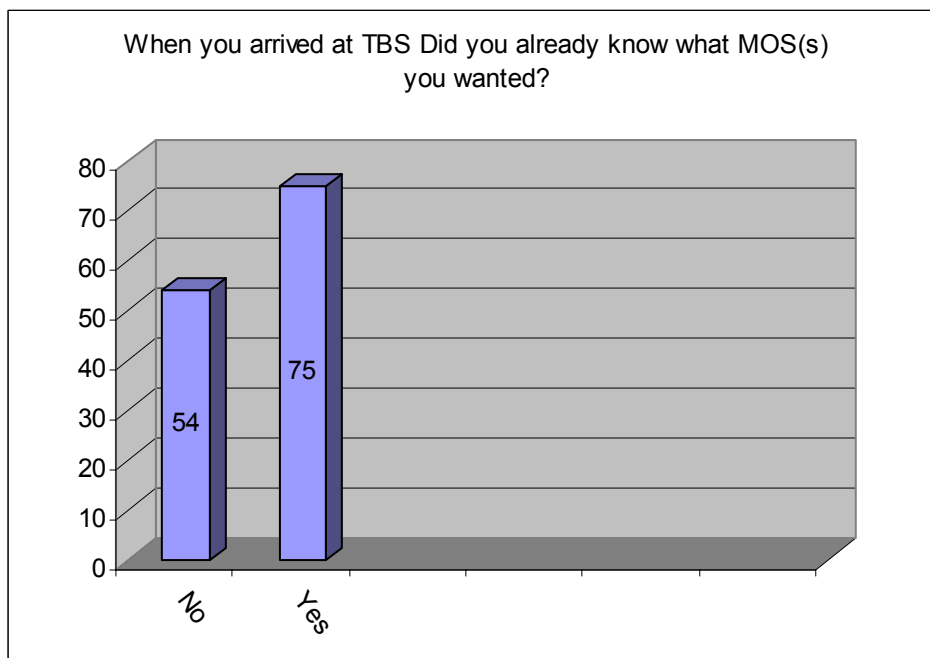
e. Future Employment

Average: 2.5

Median: 2



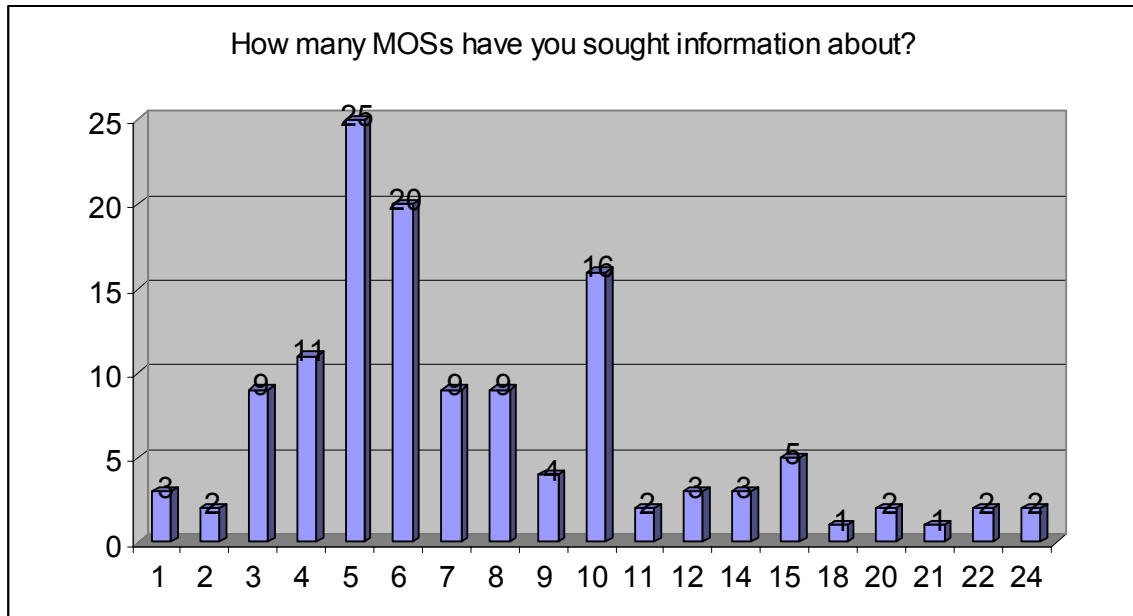
3. When you arrived at TBS Did you already know what MOS(s) you wanted?



4. How many MOSs have you sought information about?

Average: 7.7

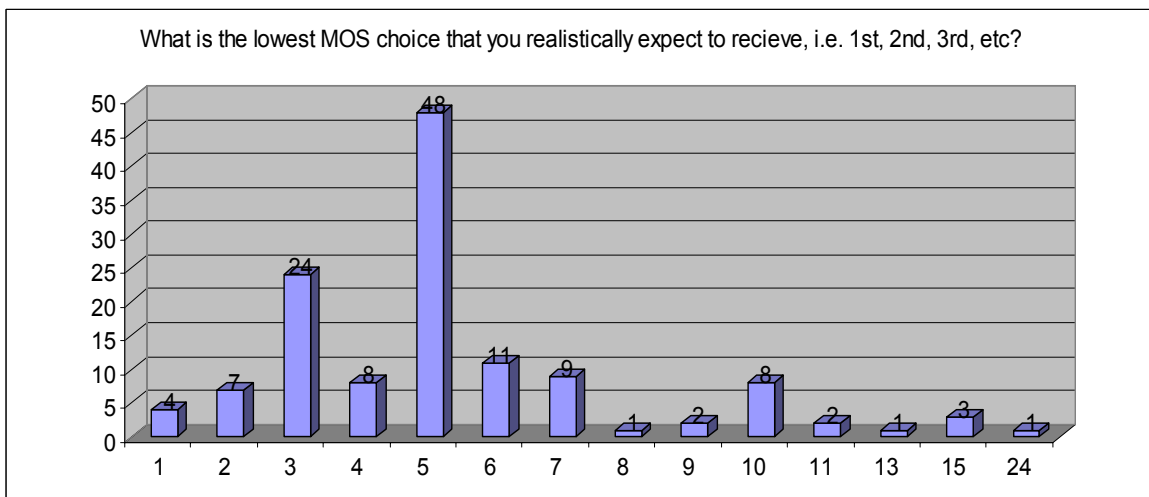
Median: 6



5. What is the lowest MOS choice that you realistically expect to receive, i.e. 1st, 2nd, 3rd, etc?

Average: 5.4

Median: 5



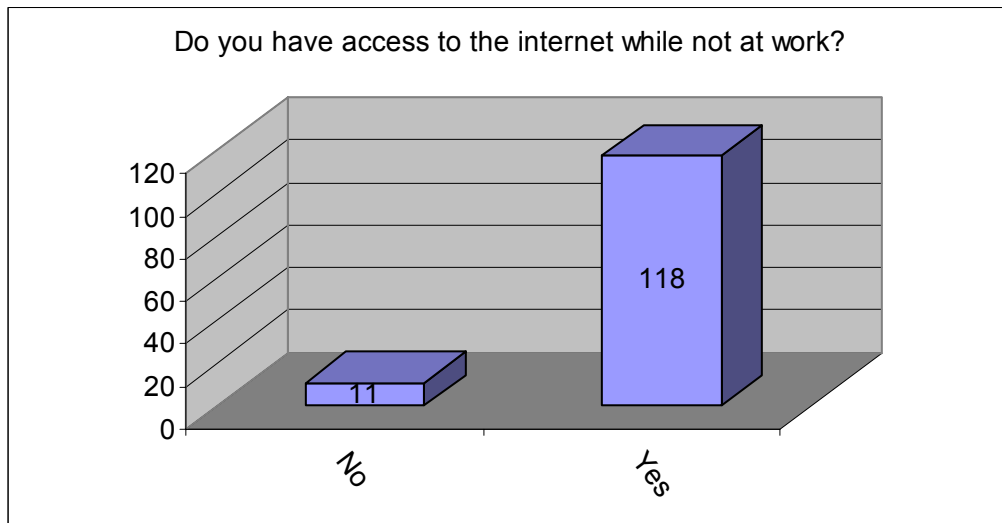
6. What is the lowest MOS choice with which you will realistically be satisfied, i.e. 1st, 2nd, 3rd, etc?

Average: 5.7

Median: 5



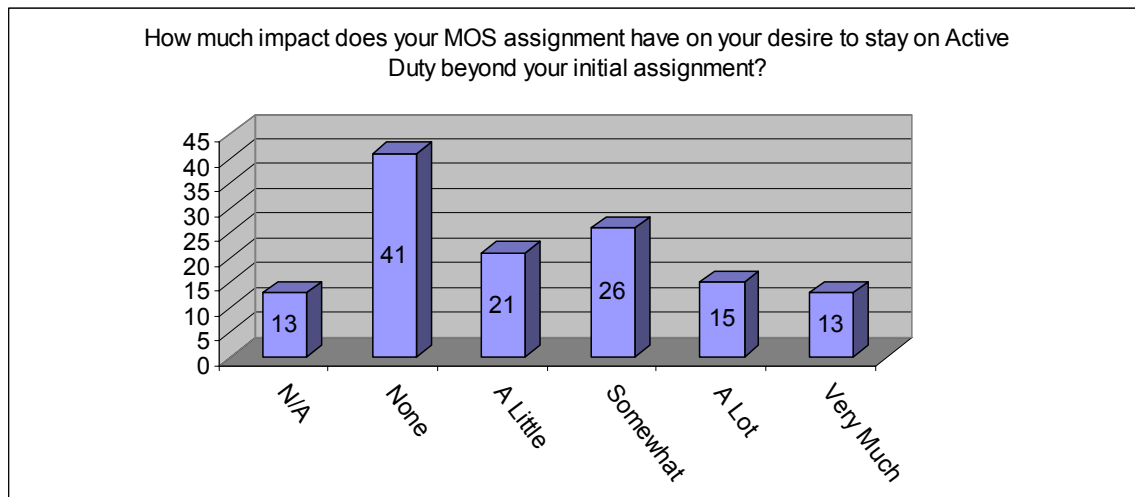
7. Do you have access to the internet while not at work?



8. How much impact does your MOS assignment have on your desire to stay on Active Duty beyond your initial assignment?

Average: 3.8

Median: 4

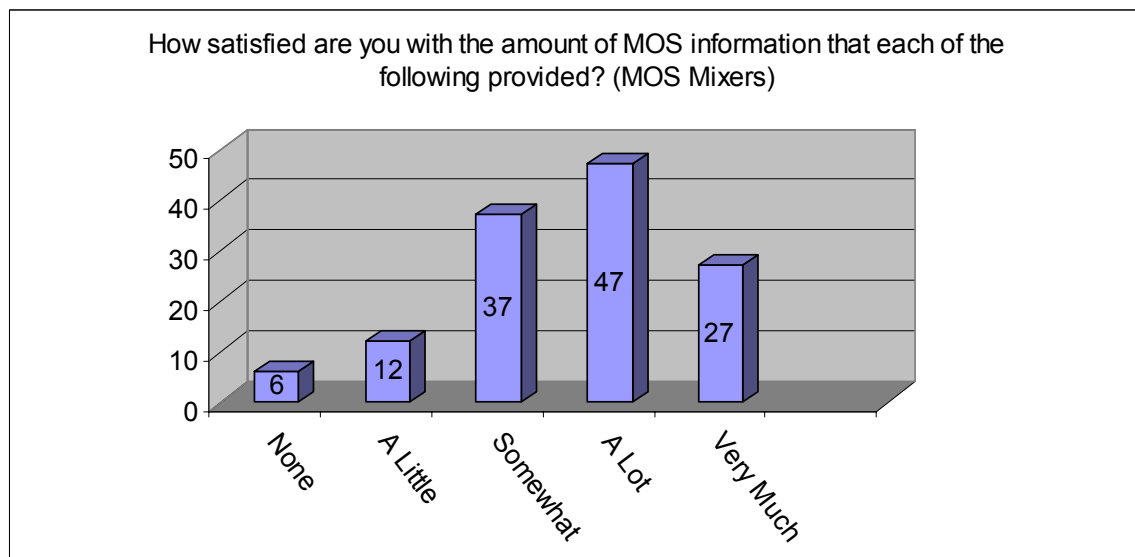


9. How satisfied are you with the amount of MOS information that each of the following provided?

a. MOS Mixers

Average: 3.6

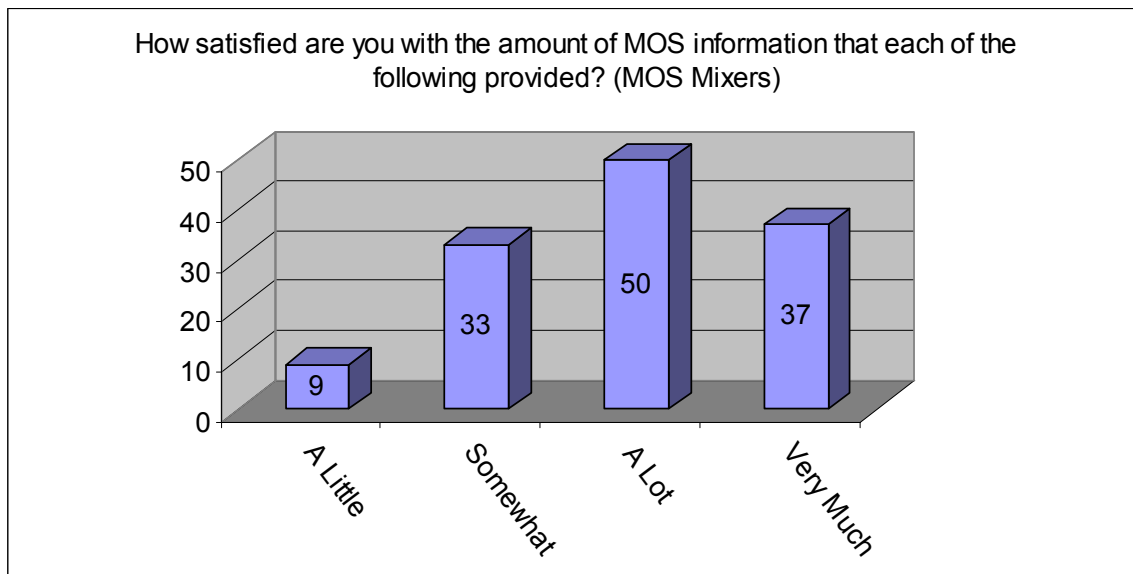
Median: 4



b. MOS Mixers

Average: 3.9

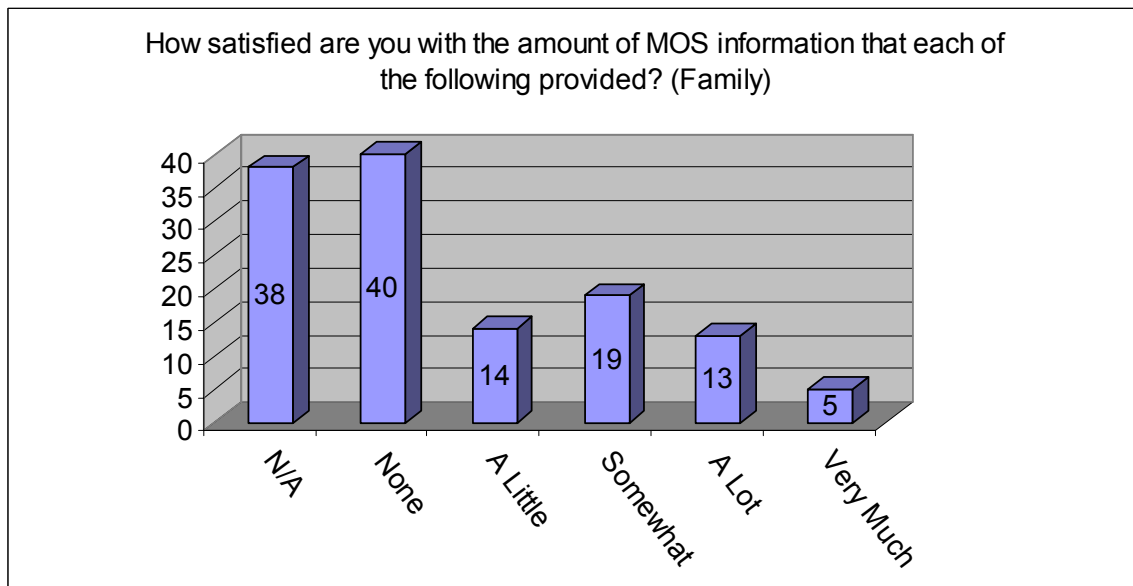
Median: 4



c. Family

Average: 1.6

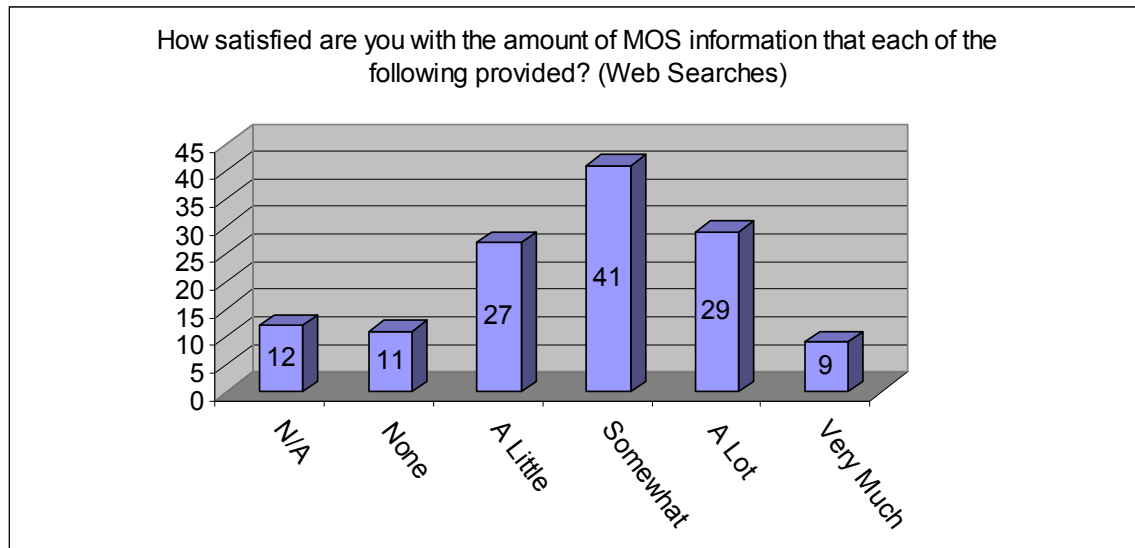
Median: 1



d. Web Searches

Average: 2.7

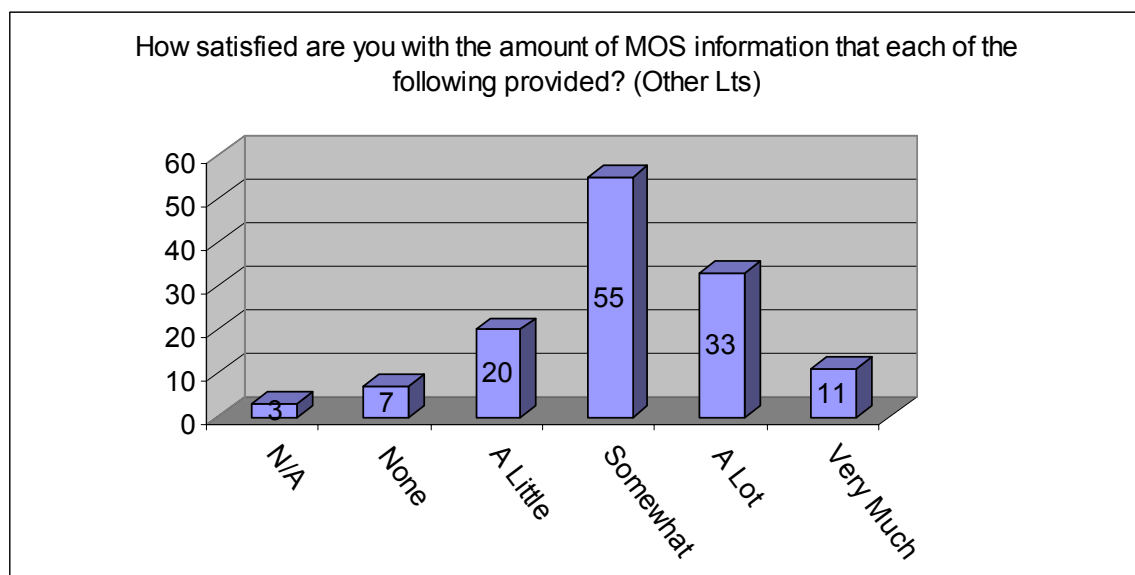
Median: 3



e. Other Lieutenants

Average: 3.1

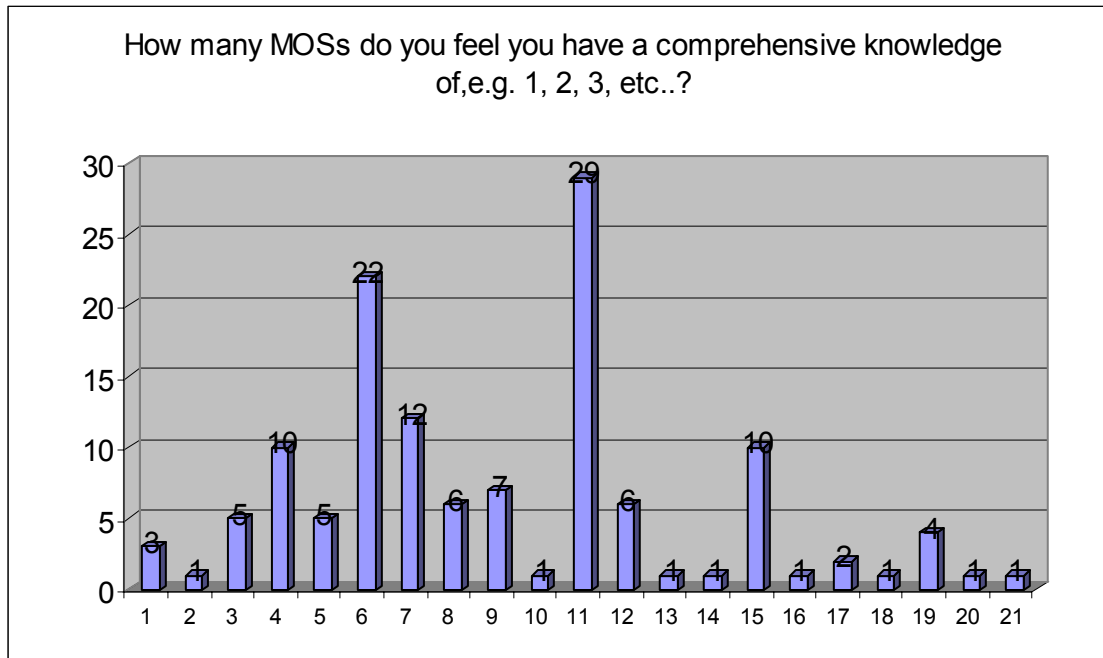
Median: 3



10. How many MOSs do you feel you have a comprehensive knowledge of, e.g. 1, 2, 3, etc..?

Average: 8.4

Median: 8



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